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Co-operation or Compulsion?

FOR a long time past it has been evident that the interests of the electrical installation contractor and architect and builder have been convergent, making it very desirable that there should be closer co-operation between them.

Recognition of this fact is manifested by the Advisory Council of the Building Industry, which, in forming five "panels" to deal with special subjects, allocated one to electrical equipment. Moreover, the Council, considering that representation on the Executive Committee should be balanced between professional and trade interests, has decided to ask for nominees from "(1) the British Electrical and Allied Manufacturers' Association, or (2) Brewers' Society, or (3) Electrical Contractors' Association."

The before-mentioned Electrical Equipment Panel has as its chairman Mr. F. W. Purse, representing the Institution of Electrical Engineers, whose work for the National Register is well known. The members are: Messrs. J. H. Leathart, H. T. Young, R. Grierson, H. Marryat, and R. Rowan. Their terms of reference call upon them to review the whole of the legislation affecting electrical installations in buildings and to report on the need for revision and the form which such revision should take.

Here they find themselves in strange company. It is the lament of the building industry that it is so beset and entangled by Acts and Orders that progress is being retarded. A determined effort is being made, therefore, to get this mass of regulations thinned out and revised to bring it up to modern requirements.

The Electrical Panel, on the other hand, "found comparatively little legislation affecting the installation of electrical equipment in buildings," and what there was consisted, for the most part, of unco-ordinated regulations.

Strange as it may appear to the building industry, the installation engineer's ambition is to have not less but greater control of installation work. The chairman of the Electrical Panel, when he was borough electrical engineer of West Ham, even went so far as to obtain legislative sanction to the enforcement of the I.E.E. Wiring Rules, and the views of the E.C.A. (which is represented on the Panel) are well known.

The Panel is not yet ready to bring forward any definite recommendation, but it appears that arrangements have been made with the I.E.E. which will secure the Institution's more practical co-operation in the matter of applying its Wiring Regulations. It is not clear from the Panel's report what this means exactly, but from our knowledge of the E.C.A.'s attitude towards the Regulations, we should infer that a move is being made towards their modification.

This seems to be an eminently practical aim for the Panel to pursue. However desirable legislation may appear, there are many drawbacks—the building industry stands out as a dreadful warning. Much better is it to seek the co-operation of architects and builders in the "voluntary" enforcement of a simple set of rules to secure good workmanship and materials in electrical installations.

But if this is unsuccessful there is only one alternative to anarchy, and that is compulsion.

Breezes at Brighton

THERE was a slight clash between electrical and gas interests at the Royal Sanitary Institute Congress at Brighton last week. Nettled by reports of the progress which electricity was making in the domestic field, gas partisans suggested that this was due to the employment of unfair methods. One speaker said that at Brighton the Corporation was installing cookers for nothing on one of its estates. He called this compulsion, but we cannot think that the provision of cookers gratis would be viewed in the same light by the tenants. In any case, the rental charges made for cookers by some gas companies are merely nominal. There have been one or two instances of compulsion in which municipal authorities have banned gas from their houses, and, while we must

agree that they were acting in the best interests of their tenants, the latter should certainly have been allowed a free choice in the matter. Both parties questioned one another's cost figures, and, no doubt, the examples brought forward were carefully chosen. In the case of the electrical industry, however, good examples are rapidly multiplying, despite (or because of) the "fuming" of the gas industry.

Domestic Electrification at Hull

ONE remarkable passage in the 1931-32 report of the city electrical engineer of Hull (Mr. J. N. Waite) is that showing a decrease of 19.4 per cent. in coal consumption per kWh generated during the last three years. Another is the review of domestic electrical progress, in which it is claimed that the Department installed more cookers last year (2,764) than any other undertaking in the country has ever installed in a year. There was also a very substantial advance in the number of other appliances hired out. An East Hull estate of 500 houses is being equipped with electric lighting, cookers and wash-boilers, and the results obtained in the first 308 houses have been very satisfactory. The cookers and wash-boilers are provided by the landlords as part of the equipment, and the Corporation hires out kettles. It has been found that the average consumption is at the rate of 1,200 kWh per annum, for which the total charge is £5, or about 2s. a week, which would require some beating by other methods. Mr. Waite says that the success of the scheme suggests that the time has arrived when serious consideration should be given by the Corporation to the advisability of equipping its own houses on the same lines.

The Photo-electric Cell

THE photo-electric cell is well past the laboratory stage in its development by several manufacturers. To many people it is known as a means of switching on and off public lighting, but it is likely in the early future to prove itself to be a valuable adjunct to industry also in the automatic control of processes. Its applications here present a field for the ingenious works electrical engineer, who can be recommended to look round his job to see whether he cannot introduce appreciable savings by its means. Supply engineers, also, should be interested, as, while the photo-electric cell is not directly a load builder, it helps to bias the works owner in favour of electrification. We see a good future for it.

A Warning

IN this issue Mr. F. Peake Sexton shows that the term "concealed wiring" may have a sinister meaning. An installation which appears quite sound where it is visible may be a terrible skeleton in the cupboard or in inaccessible positions. A test of the insulation resistance is very essential, and generally an installation which satisfies the megger is in good order. But the author's horrible example shows that this is not always so, and unless all wiring is on the surface and open to inspection there is no guarantee that things are as they should be, unless (and this is very important) the work has been carried out by a known and trusted contractor.

The British Electric Transformer Co.

THE shareholders of the British Electric Transformer Co., Ltd., have been told at the last two or three meetings that negotiations were proceeding with a view to putting the company on a more settled basis and it was generally believed that the other party to the negotiations was Crompton Parkinson, Ltd. Speculation is now set at rest by the proposals circulated with the 1931 report for amalgamating the transformer business of Crompton Parkinson with the company. This "amalgamation" will give Crompton Parkinson's control of the company, for the scheme involves the writing-down of the British Electric Transformer Co.'s capital and the conversion of this into one class of preference shares, while 40,000 5s. ordinary shares to be issued as fully paid to Crompton Parkinson's will constitute the whole of the ordinary capital of the company. Mr. Frank Parkinson will be appointed chairman, and three other representatives of Crompton Parkinson's will join the board. Messrs. A. F. and F. E. Berry will retain office, the former (at present chairman) becoming deputy-chairman. Fresh money is to be provided by the company's bankers, who will hold a debenture in respect of the loan. As, according to the directors, the only alternative to such a scheme is liquidation, the shareholders must make the best of the position and accept the proposals in the hope that the scheme will have the effect of restoring the company's fortunes.

Voltage and Power Factor

THE growing use of tariffs for a.c industrial supplies based upon power factor makes the question of voltage regulation important from another aspect than that of torque maintenance. The beneficial effect of a voltage on the high side is generally recognised, but it may easily be overdone. With either induction or synchronous motors high voltage may result in a lower power factor than the operating conditions would appear to warrant. For supplies at pressures of 3,000 V and above, undertakings are required to declare a minimum voltage which is not to be exceeded by more than 12 per cent. But it is hardly fair to penalise a consumer for poor power factor when the conditions are out of his control.

A New 24-hour Load

THERE is something to be said for the contention of the Roads Department of the Ministry of Transport that highway authorities are entitled to supplies of electricity for automatic traffic signals on as favourable terms as those granted to other long-hour users. It is pointed out that the load afforded by automatic traffic control signals is normally continuous for the whole or a greater part of the day throughout the year, and from the point of view of the supply authority the load factor will in most cases be a good one. It would appear that the rate of charge should in general not exceed the rate for l.p. power supplies of similar magnitude and should normally be more favourable than the rate charged for ordinary street lighting supplies. Where difficulty is experienced in agreeing to satisfactory terms, the Minister is prepared to consider whether any useful purpose would be served by taking the matter up directly with the undertakers concerned.

Difficult Maintenance Work

A VISIT to the British Dyestuffs Corporation's works, described this week, convinces one that the maintenance of electrical equipment in a chemical works is a special problem. It must require a stout heart not to be discouraged on finding a motor starter, for instance, that was thoroughly scraped and repainted only a few days before subjected to drippings from a pipe-line above and badly corroded Such things are daily occurrences, however, and the fact that the installation is kept reasonably free from earths, and that the general system of conductors, involving both heavy-current contacts and particularly sensitive control movements, are all operating efficiently in a highly corrosive atmosphere, are testimony to the soundness of the equipment and the thoroughness of the maintenance staff.

Retrenchment in Japan

A JAPANESE correspondent sends us the following interesting item:—"It is said that the Kwansai Kyodo Steam Power Co.'s much expected order for 50,000-kW generators and other important plant equipments has been put off, putting the makers and merchants interested in astonishment. It is unknown when the order will be placed, and what is the reason for it. The buyer's men are said to have told that they will never publish the reason."

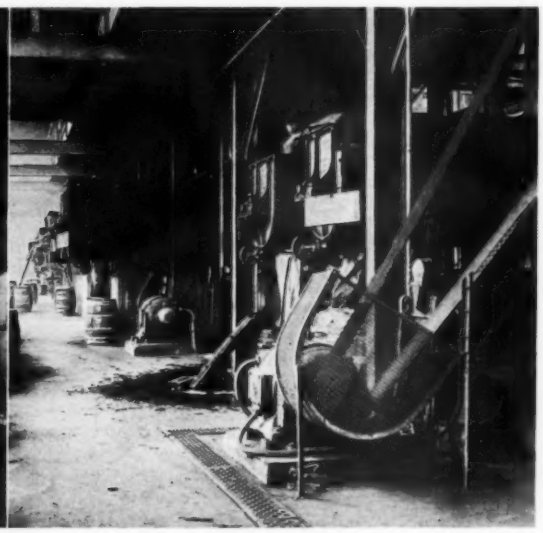
A Chemical Works Installation

An outstanding example of large-scale industrial electrification

SOME 6,000 h.p., representing 400 motors in commission; 200 kW of industrial heating load; about 5,000 lighting points; a power factor of 76 per cent., without any special correcting apparatus; and a 40 per cent. load factor. These few facts are sufficient to indicate the outstanding electrical interest of the Crumpsall Vale works, Blackley, Manchester, of the British Dyestuffs Corporation, Ltd. (Imperial Chemical Industries, Ltd.), which are devoted to the production of various dyestuffs and a number of intermediates involved in the manufacturing processes.

Electricity is used extensively for practically the whole of the operations, and very largely for the mixing in pans and vats of the different liquids and solids. In many instances small line shafts serving two or three pans are driven by a 10/20-h.p. motor, but in the larger equipments with several pans 30-h.p. or even 40-h.p. motors are employed.

A section of the ring main distribution system



Electrical drives for mixing plant

Dyestuffs are usually extracted from the mixtures by blowing the latter with compressed air through filter presses. Something like 655 h.p. of motors is in commission for air compression, generally 60-h.p. motors serving 300-cu. ft. per min. units. Much energy is also expended on the various vacuum systems used for drawing over liquids or mixtures from one section of a plant to another. Motors as small as $\frac{1}{6}$ h.p. are used on laboratory benches for agitating small quantities of mixtures during testing; many of $\frac{1}{4}$ h.p. can be seen driving exhaust fans; and motors of from $\frac{1}{2}$ to 5 h.p. are employed in numerous cases in driving centrifugal pumps for distributing acids into various receptacles.

Large Motor Drives

Several 40-h.p. motors used for grinding colour in K.E.K. mills are directly coupled through clutch pulleys to the mills, so giving each motor a better opportunity of running up to speed. The larger motors are used principally on the air compressors and water-distribution pumps, and two 180-h.p. motors serve ammonia compressors. When running continuously these compressors together can produce about 100 tons of ice per twenty-four hours. In some cases, however, instead of using ice for cooling, a large quantity of brine is circulated into the equipments direct, and a 20-h.p. motor pump is used for this purpose.

In addition to a supply from Manchester Corporation, much water is obtained from two wells on site. In each case the water is pumped directly from the bore by a 25-h.p. motor, at up to 25,000 gal. per hour, into a tank from which it is distributed by two 60-h.p. motor pumps.

When the demand for water is so reduced that the pressure in the mains rises to a stipulated figure, an Igranic diaphragm-type pressure switch through contactor gear, &c., shuts down one distribution motor. The remaining pump set is controlled by a float switch so that the tank is just kept filled. Decreased pressure in the mains results, at a predetermined point, in reverse operation of the diaphragm switch and in putting into commission the second motor. With this method of control of the pumps many hours' running of the motors are saved and some thousands of gallons of water are kept in reserve.

Several electrically operated hydro extractors are to be seen throughout the works engaged in drying off and separating various products. In most cases 18-h.p. directly coupled vertical motors are employed, with speeds round about 1,000 r.p.m. Practically all the sheds are served with up to three electric hoists each, mostly of the Wadsworth type, while in a number of instances transporters served by 10-h.p. motors are found to be more useful for communication between the departments.

In the Laboratories

A fair amount of d.c. is used for such purposes as electrolytic work in the laboratories, battery charging, and for energising magnets used principally for separating ferrous foreign matter that may be in the mixtures during their conveyance from the crushers to the rotating plates in the grinding mills.

One of the most interesting electrical applications in the laboratories is in connection with the rapid and accurate analysis of substances so intensely coloured that ordinary indicator methods of titration are inapplicable; the electrometric apparatus employed is the chemist's "electrical eye." A simple case is the determination of the amount of alkali present by quantitative titration with an acid of known strength. In relatively colourless solutions titration is effected by carefully running the acid from a calibrated burette into the alkali. To mark the exact neutralisation of the alkali with an acid an "indicator" is used, a suitable dyestuff which possesses totally different colours in alkaline and acid solutions. As soon as a sudden and well-defined colour change occurs, therefore, exact neutralisation has been achieved. Such titrations are manifestly impossible in the case of solutions which are already coloured.

The top of an electrically heated convertor

When a suitable electrode is immersed in such a solution being titrated the e.m.f. between the electrode and the solution varies in a definite and regular manner with the degree of acidity (pH value) of the solution. At the point of neutralisation the e.m.f. changes very rapidly, and by plotting the e.m.f. against the burette reading the end-point of the titration is determined with great accuracy. The end-point coincides with that given by the "indicator," and hence in coloured solutions the electrical method will give the same result as would be obtained in a

D

colourless solution containing the same amount of alkali.

The electrical method is also widely employed in measuring the degree of acidity of solutions, and measurement of the p.d. between a suitable electrode and the solution may be relied upon to give the required information with a high degree of accuracy. The liquid under test is connected by a suitable liquid "bridge" to a normal calomel electrode, and the e.m.f. between the electrode in the test solution and the calomel electrode is measured to the nearest millivolt by a suitable potentiometer. The latest form of electrode for such measurements is the "glass electrode." The e.m.f. set up between the two faces of a very thin glass electrode is a function of the pH value of the two liquids with which the glass is in contact.

Owing to the high resistance of this circuit a valve electrometer is used in connection with the potentiometer, the combination being virtually an electrostatic voltmeter. The glass electrode is of great value in determining the pH value of solutions which interfere with the normal working of other electrodes, *i.e.*, those containing oxidising or reducing agents, or substances which "poison" the electrode. Electrometric methods are also applied to the automatic control of a number of processes; for example, large-scale neutralisation during the manufacture of dyestuffs.

Electric Heating Employed

Many containing vessels throughout the works are equipped with elements for electrical heating, with loadings varying from 1 to 150 A, all of which were made and fitted by the Electrical Department. Experience has shown that it is possible to heat practically any form of unit in this way, and in most instances the method is quicker and cleaner than gas or coal firing. The elements principally used are porcelain wound with nichrome wire, although in some cases the wire is wound on ordinary conduit with a layer of asbestos baked round it.

For tubes up to 6 ft. long by 4 in. diameter, asbestos paint is first applied, and then two layers of asbestos ¼ in. thick are moulded on, care being taken to keep the dividing positions opposite. The whole is then again treated with asbestos paint before being wound and filled in with a mixture of asbestos paint and powder. This method has never failed to prevent the resistor wire from creeping together as is often the case when expansion occurs on temperature rises.

A noxious-gas leakage indicating outfit which we saw fitted to one large equipment is of considerable electrical interest. The leakage is detected, an alarm given, and a motor-driven pump for injecting neutralising acids into the gas is automatically started up. A photo-electric cell is arranged to receive light through a sheet in the path of the gas which may escape. The sheet is chemically treated so that a reaction is caused by the escaping gas, with the result that the intensity of light received by the cell is altered, thus controlling the grid of a 164-V Mullard amplifying valve. The additional energy passing between the plate and grid of the valve operates relays connected with contactors controlling the motor of the acid pump.

Continued running of the motor is assured until the gas leakage has been attended to, and a recording meter supplies the chemist with much valuable information as to the times of gas escape and when the operator attends to the plant.

Among many other interesting developments of the Electrical Department is apparatus for cutting glass tubes, bottles, etc. A single turn of a nichrome wire in the secondary circuit of a small transformer is wound round the tube where separation is required, and heated up. Expansion of the glass at the line of contact of the wire results in a particularly clean and even "cut." A crack has never been experienced.

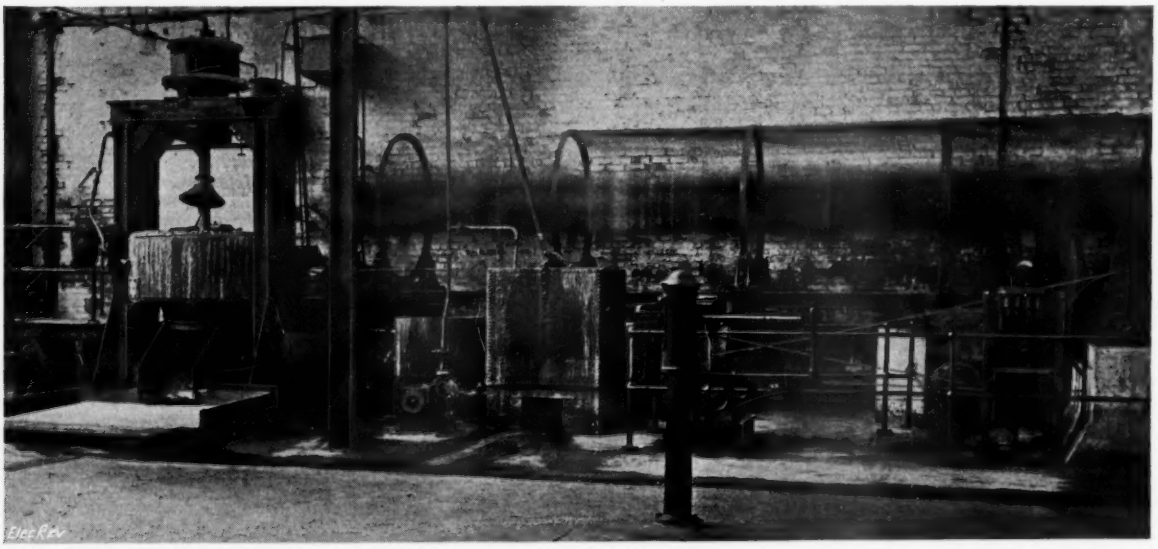
Another device is for the automatic temperature control of liquids. Ordinary radio valves are thermostatically operated, and they operate, in turn, relays which put in circuit when required up to three small heating elements. Special electrical precautions are taken in all sheds in which inflammable materials prevail, and particular attention is given to the earthing of pipe lines carrying benzene, toluene, and other liquids likely to give rise to frictional electricity during their flow.

Sub-stations and Switchgear

Supplies are received from the Manchester Corporation undertaking at 6,400 V at opposite ends of the works. There are four sub-stations throughout the factory, equipped with two 1,000-kVA and four 500-kVA transformers. Several switching stations fed from these sub-stations permit sectionalisation of the whole installation.

The north end of the works has lately been converted from d.c. to a.c. Main Reyrolle switches control Ellison distribution units which serve, in the works, 300-A Parmiter, Hope & Sugden t.p. boards governing 100-A to 5-A units.

The new motors involved in the conversion scheme are all of the totally enclosed and pipe-ventilated types, mostly controlled by Ellison starters, and they are standardised in make according to their sizes. The object of this is to obtain the best possible power factor without external correcting apparatus. For instance, the 1-, 20- and 30-h.p. motors are of Metropolitan-Vickers manufacture; the 2½-h.p. motors were supplied by Messrs. Newtons of Taunton (2,930 r.p.m.), and Mather and Platt, Ltd. (715 r.p.m.); the 3-, 5- (1,450 r.p.m.) and 7½-h.p. (715 r.p.m.) motors are also of M. & P. manufacture; the 5-h.p. (730 r.p.m.) motors are E.C.C. machines; and Crompton & Parkinson, Ltd., supplied the 40-h.p. motors.

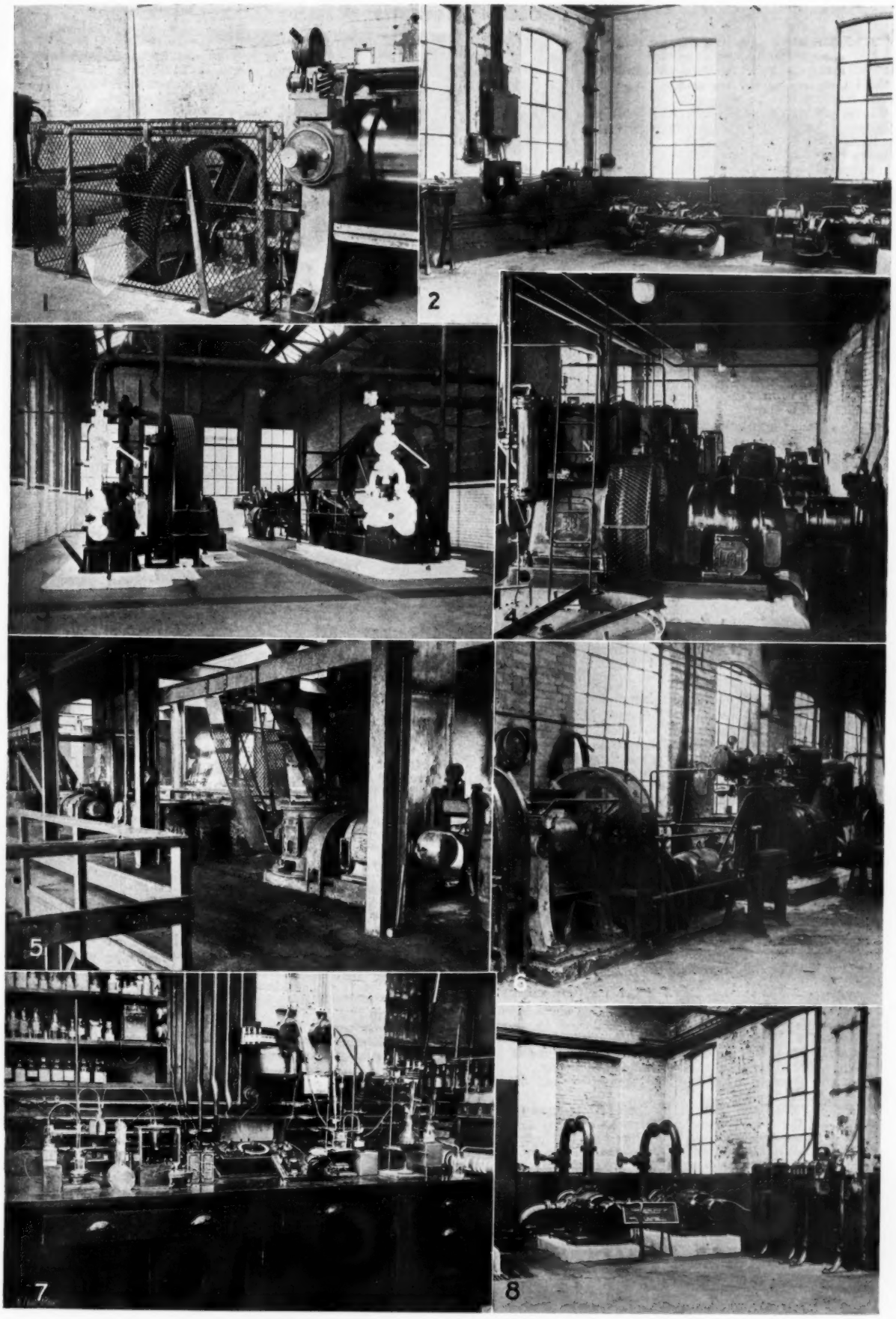


An electrically driven hydro-extractor and drive for an oscillating trough (in movement when the photograph was taken)

At the south of the works 90 per cent. of the motors are of the Mather & Platt "K.C." type. Most of the motors are supplied at the power-distribution pressure, three-phase, 420 V, but the smaller ones are fed in the same way as the lighting system, at 240 V—phase to neutral. Except in a few cases, where c.t.s. cable is used, there is no open wiring. To protect the lead sheathing from lime, etc., all wall-fixed cables are carried on creosoted and tarred boards.

There is a system of h.p. ring mains round the works. Three-core 91/0.101 cables are suspended from catenaries carried by "H" poles, but owing to the catenaries being attacked by the gases in the atmosphere, the placing of these cables underground is being contemplated. All the departments, etc., throughout the factory are served by a "Relay" automatic telephone system.

Generally speaking, considering the conditions under which most of the electrical equipment serves, there is very little trouble indeed. Great attention to the apparatus is necessary, however, to bring about this happy result. In many cases, for instance, motors and starters, etc., are thoroughly scraped, cleaned and painted as often as once every three months.



Electrical Plant in the Works of the British Dyestuffs Corporation

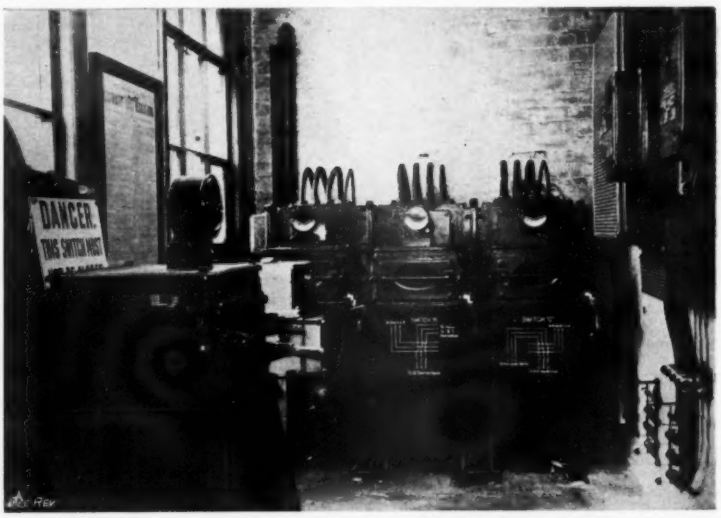
1. A motor-driven rolling mill. 2. Effluent pumps with a total capacity of 15,000 gal. per hour. 3. Ammonia compressors producing 100 tons of ice per day. 4. A line of motor-driven air compressors. 5. Motors driving K.E.K. grinding mills. 6. Electrically driven workshop plant. 7. Electrometric apparatus in the analytical laboratory. 8. Automatically controlled water distribution pumps—26,000 gal. per hour each.

Electricity *versus* Gas

THE relative advantages of gas and electricity were discussed on July 12th at a conference of representatives of sanitary authorities held in connection with the forty-third Congress of the Royal Sanitary Institute at Brighton. The meeting was presided over by Alderman T. J. Braybon (Mayor of Brighton), who referred to an estate of 110 all-electric houses recently built on a central site, 2s. 6d. per week being added to the rent for electrical fittings, &c., and electricity being supplied at ½d. per kWh.

Papers were read by Mr. P. E. Browne (distributing engineer, Brighton, Hove and Worthing Gas Company) and Mr. W. N. C. Clinch (borough electrical engineer, Brighton). The latter pointed out that a comprehensive comparison between gas and electricity was not possible, as the former was merely a means of conveying heat whereas electricity was not merely a substitute for gas, but was in itself natural energy comparable with no other, possible of ready conversion into heat or any other form of energy at an efficiency considerably higher than was possible with any similar application to which gas in its limited sphere could be applied.

The author commented in general terms upon the application of electricity in the home, by means of which every operation involving manual labour could be carried out and a hygienic atmosphere and more comfortable surroundings could be achieved. The bogy of cost was readily discounted in actual practice, and the statement that the use of electricity is difficult and complicated had been entirely disproved by experience on a Brighton housing estate. Rather more than 200 houses had been built and on the score of initial capital expenditure it was considered inexpedient to provide gas for heating in addition to electricity for lighting. Therefore, electric cookers, water heaters, &c., were installed and, although in nearly every case the occupants had had no previous experience of electricity, the opinions expressed quite impartially by the owner-occupiers and tenants were in themselves testimonials to the advantages and convenience of electricity, whilst the cost certainly showed a saving over the means previously adopted.



One of the switching stations at the British Dyestuffs Corporation's works described in this issue

Discussion

In opening the discussion on the paper, Mr. A. E. McKenzie (borough electrical engineer, Wimbledon) said there need be no hesitation in making council houses all-electric on account of cost of operation where charges for supply were not more than 6d. per kWh for lighting, 1d. for cooking, and ¾d. for water heating. In Wimbledon the charges were 3¼d. per kWh for lighting, ¾d. for heating in winter and ½d. in summer, ½d. for cooking, and ¾d. for water heating in winter and ½d. in summer. The average annual cost per house with three or four bedrooms, two living rooms, kitchen, and usual offices was £14 17s., using electricity for all purposes. Nine years ago Wimbledon had no electric cookers, but there were to-day over 4,000, or one to every six electricity consumers; they were being installed at the rate of about fifteen per week.

About two years ago one of the largest hospitals in Wimbledon was considerably extended, and after some trouble he induced the governors to so arrange the kitchen that one-half was equipped for electric cooking and the other half for gas cooking. After twelve months no gas whatever was used.

Electric water heating was advocated in Wimbledon exclusively in summer, whilst in the winter it was advocated in conjunction with a solid fuel fired boiler. An immersion heater of 2-kW capacity in a 25-gallon tank would raise the water 100 deg. F. at a cost of 4d. with electricity at ½d. per kWh. Electricity was unsurpassed for occasional room heating, and there was no need to "promote ventilation," the catch-phrase of gas.

Mr. V. W. Dale (British Electrical Development Association) said that Mr. Browne's implication that the gas industry had a monopoly in artisan dwellings was far from the fact.

Besides Wimbledon, in Woolwich there was an estate of 2,171 houses and in between 800 and 900 of them there were no fires apart from a coke boiler. The rents varied from 11s. to 15s. 6d. per week, the average cost of construction being £470. The average income of the tenants was from £2 15s. to £3 10s. per week, and the average price for electricity, including lighting fittings and cooker, was ¾d. per kWh. The greatest consumption was 10,000 kWh per annum; that might seem large, but it represented the use of electricity for all purposes, and the actual bill was just over £20. A new estate was now being developed in Woolwich, the houses costing £400. Electricity was being supplied for a primary charge of 16s. per quarter, or 1s. 3d. per week, and a running charge of ½d. per kWh for all purposes. The electric cooker was hired at from 5d. to 7d. per week and in open competition with gas the Electricity Department had secured about 60 per cent. of the houses.

In Manchester there was an estate of fifty-eight houses in which electricity was used for lighting, ironing, a wash boiler, bedroom heating, and cooking. The lowest consumption was 708 kWh per annum and the highest 4,349 kWh. The lowest bill was £4 4s. 2d. and the highest £12 9s. 3d., the average consumption being 1,832 kWh and the average cost per annum £7 2s. 11½d. All tenants were completely satisfied, and there was a growing demand in the district for "electric houses." In a similar way in Birmingham in middle-class houses using electricity for lighting, cooking, two kettles, two radiators, iron, curling tongs, fan, vacuum cleaner, immersion heater, wireless receiver, hotplate, hair dryer, and battery charger there was a total consumption of 8,765 kWh and with a tariff of £2 per annum plus ¾d. per kWh in the winter and ½d. in the summer, the total cost was £27 per annum, including the hire charge for the cooker and only half a ton of coal.

Over 300 electricity undertakings had assisted wiring, hire, and hire-purchase schemes in operation. He quoted figures for gas consumption in a typical middle-class house which suggested that there was some mistake in Mr. Browne's figures.

Mr. W. H. Beckett (Gas, Light and Coke Co.) and Mr. C. F. Botley (Hastings Gas Company) both strongly protested at the manner in which gas had been referred to by speakers representing the electrical industry; and Miss Howard said that, although she was an enthusiast for electricity and had had considerable experience of it in Canada, she had found in London flats that in cost and time of heating electricity did not compare with gas. She had found it necessary to use gas rings for quick boiling, but for hot water storage electricity had the advantage.

Alderman Mattison (Middlesbrough) expressed regret that such antagonistic views had been expressed. The best use should be made of the two commodities for the purposes for which they were most suited.

Authors' Replies

Mr. Clinch, in a brief reply, said that, although there was healthy competition between gas and electricity in Brighton, there was also considerable understanding between those in charge of the two undertakings. Comparisons could only be made in like circumstances.

Mr. Browne, who also briefly replied, took exception to the "red herring" which the electrical people were always drawing across the trail concerning the products of combustion. The gas industry had been trading for over 100 years quite successfully and it was not dead yet. Housing estate tenants adopted electricity in many cases under compulsion and sentiment did not enter into it. On the Rottingdean estate mentioned by Mr. Clinch, the Brighton Electricity Department or the Housing Committee provided electrical appliances gratis. That was not competition or sentiment, but compulsion.

Industrial Illumination

"Hygiene in Industry" was the subject of a paper read by Mr. W. J. Jones, manager of the Lighting Service Bureau, London. Mr. Jones said that there was still a lamentable tendency on the part of most industrial executives to consider lighting as an expense which must be borne grudgingly. This view could not be substantiated, since light had an important bearing on both the well-being of the worker and the overall efficiency of the plant. It was possible to get an average of 220 candle-hours for 1d. as against only 83 candle-hours for 1d. in 1922. The average cost of providing good illumination was about ½d. per hour per worker.

In most factories the cost of lighting represented less than 1 per cent. of the wages bill, and hence the value of a very small increase in output due to better lighting amply met the additional lighting cost. Great improvement could be made by an organised system of maintenance.

Some Driving Forces in the Electrical Industry

Directors and Officials of Ferguson, Pailin, Ltd.

1. Mr. G. Pailin, director and chief mechanical engineer. 2. Mr. S. Ferguson, chairman and managing director. 3. Mr. A. J. Bailey, works manager. 4. Mr. F. Clegg, progress engineer. 5. Mr. J. J. Swarsbrick, sales engineer (Northern Area). 6. Mr. E. M. Dakin, designs engineer. 7. Mr. V. A. Brown, electrical research engineer. 8. Mr. A. J. Nicholas, tenders engineer. 9. Mr. J. R. Wilkinson, sales engineer (Southern Area) (*Elliott & Fry*). 10. Mr. W. H. Miller, contracts engineer. 11. Mr. J. Ashworth, mechanical research engineer. 12. Mr. H. Boardman, secretary. 13. Mr. R. A. Rowbottom, outdoor constructional engineer. 14. Mr. J. W. Hammond, purchasing agent.

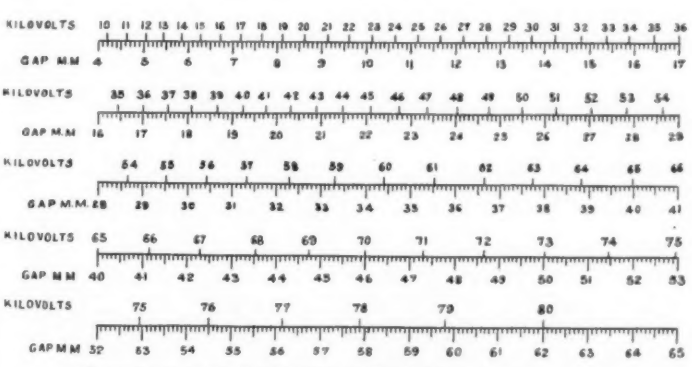
Sphere Gap Measurements

COMPLETE tables of sphere gap settings and corresponding breakdown voltages have been published in a B.E.S.A. standard, and there are also available large-scale curves connecting these two variables published by the B.E.A.I.R.A. It is, however, a feature of the tables that it is difficult to plot them as curves in Cartesian co-ordinates, to the degree of accuracy necessary, on a sheet of reasonable size.

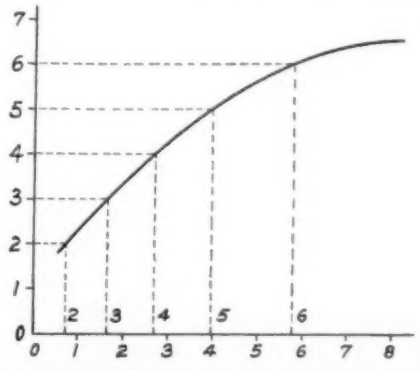
To overcome this difficulty recourse has been taken to splitting the curves up into two sections and plotting the two sections on one graph, at the same time avoiding the mass of co-ordinates usually associated with a graph by removing all printed on an octavo page and would give results to the same degree of accuracy as the large B.E.A.I.R.A. wall charts.

The chart is also much easier to read than a graph in Cartesian co-ordinates. It is possible that conversion scales have not been used for non-linear functions because of an apprehension that the scale would come out unduly uneven, but it is as easy to read as slide rule.

The method of deriving, graphically, a conversion scale from a non-linear curve is shown in the diagram, which is self-explanatory. In practice it is much easier to plot the figures direct on to the scale instead of deriving them graphically by



Conversion scale (breakdown voltage) r.m.s., 62 mm. spheres—one sphere earthed



Graphical derivation of conversion scale for non-linear experimental curve

except those adjacent to the curves. Even so, the graphs are very large and are difficult to read.

A much superior method is to plot the figures in the form of a conversion scale, such as that shown, which is for 62.5 mm. spheres. Before reduction for printing this chart measured approximately 6 in. by 4 in., and if plotted to the same scale in Cartesian co-ordinates would occupy a sheet 80 cm. by 65 cm. It is immediately evident that this chart could be projection, but the figure is useful in making clear the connection between the curve and the conversion scale.

This method can be applied successfully to a great many calibration curves, for a calibration curve is a conversion scale. The particular example has been chosen because it represents a chart which is constantly in use for high voltage testing and in Cartesian form it causes much eyestrain and frequent errors in reading.—D. JAMIESON, Stud. I.E.E.

High-voltage Alternators. By W. Sharp, A.M.I.E.E., A.M.I.Mech.E.

Modern trends in design

EXCEPT from private companies generating on a small scale (up to 1,500 kW), inquiries for low-voltage turbo-generators are practically nil. The chief difficulties in their construction lie in the connecting rings and the terminals; the section of the copper is large, space is limited in standard frames, and the terminal leads are too close together. With one machine (600 V, 3,600 A) having six ends brought out the temperature of the atmosphere in the vicinity of the terminals was over 200° F. A good plan is to bring out the neutrals in a group, but separately insulated, and to use the remaining space for the three-phase leads. This arrangement has proved satisfactory at 440 V and 4,100 A.

Mr. W. Sharp, of the G.E.C., has had a very wide experience in the design of electrical machinery

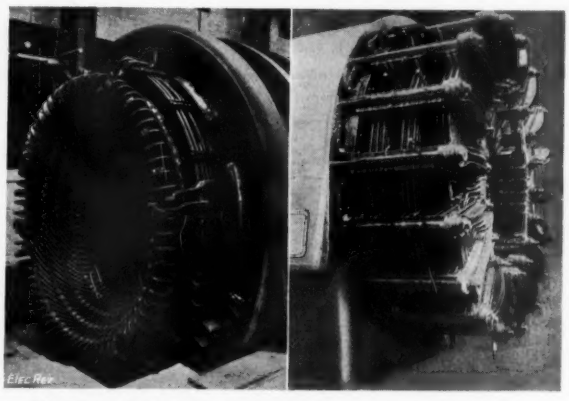
The commonest voltages are 3.3 and 6.6 kV. In 1905, 11 kV was adopted in a few cases, but only about fifty machines are now generating at this pressure, most of which have been ordered during the past five years; a few 13.2-kV machines are also in use. At the Brimsdown station of the North Metropolitan Electric Supply Co. there are two turbo-generators operating at 33 kV. These sets, together with one at Langebrugge, are the only machines constructed for this voltage.

Generators above 40,000 kW provide a new problem because the transmission pressure will be from 22 kV to 132 kV and high-voltage machines (which incorporate sufficient inherent reactance to limit short-circuit current to a reasonable figure) are desirable.

Joints in Stator Windings

The weakest part of an a.c. generator is the stator winding. Connections are unavoidable but for safety soldered joints (whether on the field or the armature) should be entirely avoided. Several breakdowns have occurred due to soft solder, and joints in electrical machinery should be brazed or welded wherever practicable.

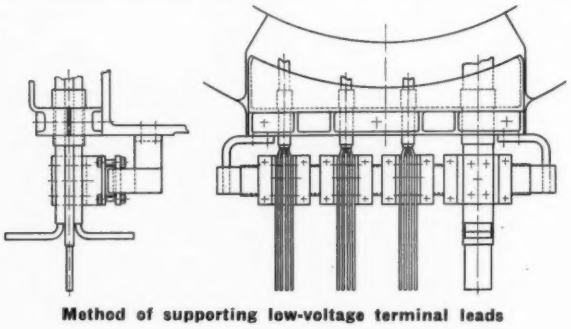
From an engineering point of view all joints are a source of weakness, and with the concentric type of winding there must be a large number of connections (possibly four in each turn). The heavy clamping arrangements are also a possible danger, since wood appears to be extensively used. This type of winding has, nevertheless, been successfully used for generating at 33 kV. (See *Journal* I.E.E. Vol. 67, page 1,065.)



Diamond (left) and concentric types of stator windings

The diamond type of winding lends itself admirably for this class of construction, there being only one joint on each coil. One or two hoops attached to six vanes on the end plate at the back of the winding are sufficient to support the coils, since, under short-circuit, there is a definite tendency for the forces to cancel out. At the present time a large number of American machines with the diamond winding are generating successfully at 18 kV and 22 kV, and provided the output is not too low 33 kV is not impossible of achievement.

The rating of a generator supplying a 22- or 33-kV transmission system depends on stability when operating on loaded lines rather than on temperature. In up-to-date turbo-generators the possibility of breakdown due to insulation (apart from troubles caused by corona discharge) is extremely remote. Further, the deterioration of insulation resulting from grit and external impurities is (by the introduction of the closed air-circuit ventilating system) negligible.

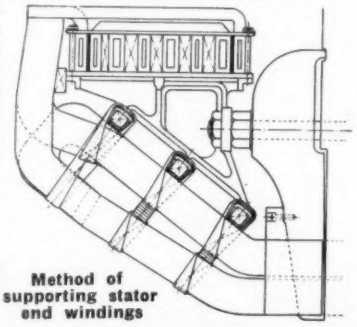


Method of supporting low-voltage terminal leads

Methods of Insulation

In some American designs the insulation of the coils is composed entirely of a number of layers of mica tape, which entails considerable care and minute inspection during manufacture, but with pressures up to 22 kV there is no corona discharge. Other manufacturers rely on mica folium or micanite wrap, and corona discharge is reduced to negligible proportions.

It has been said that "impregnation of mica insulation is a doubtful advantage, since it is difficult to obtain a compound which remains solid at the temperatures at which modern machines are operated." To "impregnate" means to saturate, and present practice is to wrap on to the conductor mica folium brushed with insulation compound, to make it adhesive, heated to remove the volatile component, and baked into a solid condition. We cannot saturate 3 to 8 mm. of mica treated in this way, so that in some generators the "impregnation" of the stator conductor insulation is questionable, but in the Brimsdown machines the insulation of the conductors, consisting of mica folium and shellac varnish, was impregnated with shellac varnish.



Method of supporting stator end windings

In the Waukegan (Northern Illinois) 115,000-kW 18-kV machine, the stator conductors are insulated with mica tape with asphaltum base binder. The insulation was moulded in place so as to secure a dense insulation free from occluded air, and a layer of varnished asbestos tape placed on the outside of the coils to form a corona sheath. The whole winding was subjected to the standard A.I.E.E. test of 37 kV for one minute, and there was very little evidence of corona at this voltage. The end windings are supported by lashing to insulated non-magnetic brackets, which form ring supports, and avoid closed circuits for stray currents induced by leakage fluxes.

Slot Insulation

One of the limiting factors of high voltage design is the slot insulation, which for 33 kV must be about 8 mm. thick. For example, a 90-slot 33-kV machine has a slot insulation of 16 mm., giving 1,440 mm. in circumference. This figure alone requires the stator bore to be 460 mm. in diameter, so that, allowing for the width of the stator teeth and copper, the general mechanical construction will call for a reduction in the number of stator slots from 90 to 72 or even 60. A special shape of slot is also required whereby the tooth may be made sufficiently large at the bore of the stator.

On a 50-cycle supply 22 kV will appear to be the more practicable voltage for large turbo-alternators operating at 3,000 r.p.m. Even at 22 kV suitable screening will have to be introduced to minimise the effect of corona discharge, but further research in the use of new insulating materials may result in reducing the thickness of slot insulation.

Normally the minimum creepage distances from the end of the stator core to the end of the insulation tube on each conductor may vary, as follows: 11 kV, 100 mm; 22 kV, 175

Contactor Starters

IN our Power in Industry special issue of June 17th, an article by Mr. H. B. Poynder drew attention to the advantages of direct-on starting for squirrel-cage motors. The British Thomson-Houston Co., Ltd., has introduced for this duty a range of compact triple-pole contactor starters; these are of unit construction with front-connected terminals protected by arc-chutes, and under-voltage protection.

The smallest of the range, Type TMC 880, has a maximum continuous rating of 20 A. Its twin self-aligning contacts consist of convex silver buttons welded to steel supports. The contactor is designed to close with a quick positive action —a feature as important as the quick-break action which is also obtained under the solenoid control.

Thermal Relays

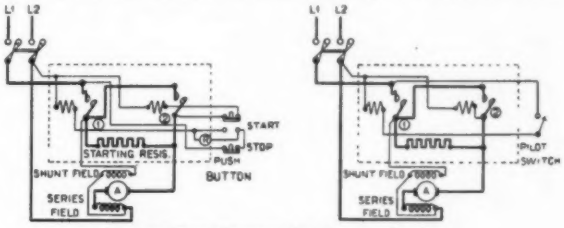
The hand reset latched type over-current relay gives protection on two or three phases. The thermal units are indirectly heated and changing the heaters to alter the settings does not disturb the calibration. As operation depends upon the heating characteristics of the current flowing, the temperature conditions of the motors are closely followed; thus, a short 25 per cent. overload would not operate the relay, but prolonged or heavy short overloads would cause the motor to be shut down.

Start and stop push buttons are normally mounted in a recess in the front cover, but if thermal relays are not employed a separate push button is required. Remote control can be easily arranged. The starter base is of moulded insulation. An enclosing case can be provided of pressed sheet steel or with a sheet-steel body having c.i. end plates and hinged cover. The first type has bushed holes to take v.i.r. cable; one-inch conduit with external and internal nuts or cable clamp for v.i.r. cable; the composite case has two tapped holes for conduit or can be fitted with armour cable clamps.

A third type, TMC 640, is designed for a m.c.r. of 75 A. It is generally similar to the 40-A model, but push buttons are not included as provision is made for remote control. A mechanical reset button in the front cover operates the thermal over-current relays. Reversing starters can be built up for two of these contactor starters interlocked mechanically so that one is open when the other is closed.

D.C. Motor Control

For d.c. systems contactor starters (Type RMC 1136) are supplied for the control of shunt, series, or compound non-

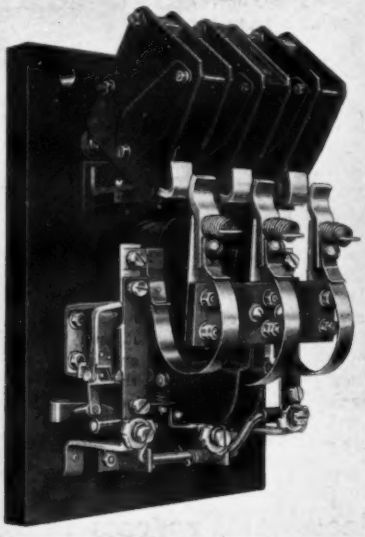


Connection diagram for d.c. contactor

reversing motors when the friction loads against which they accelerate will permit the current to drop to 50 per cent. of full load for machines up to 2 h.p. and 30 per cent. for machines up to 5 h.p. These are rated for 15 starts per hour with 2½ times full-load current on the first point and three times on the second.

The starter consists of two-single pole contactors and one division of starting resistance mounted on an ebony Sindanyo

A.c. direct-on starter (20-A)



A.c. direct-on starter (40-A)

Contactor starter for 230-V d.c. motor

The 40-A starter, Type TMC 870, has fixed and moving contacts, the latter being clamped to an insulated bar operated by the pivoted armature of the magnet system. The contacts close with a combined rolling and sliding motion. The (optional) thermal over-current relays consist of two single-pole units similar to those supplied for the smaller starter. The starter has a slate base and an enclosing composite case can be supplied. Tapped holes for 1¼-in. conduit or armoured clamps and sealing boxes are provided for cable entry.

case enclosed in a sheet-iron case. The contactors have a pressed-steel magnet system. The moving contacts are pivoted and are provided with spiral compression springs and have renewable tips.

The resistance elements consist of porcelain-ended tubes wound with wire and covered with cement, and thermal over-current relays, similar to those incorporated with the a.c. starters, can be supplied. Under-voltage release is an inherent feature.

High-voltage Alternators *(Concluded from preceding page)*

mm; 33 kV, 250 mm. By judicious tapering of the mica insulation and satisfactory sealing of the joint these distances may be reduced, somewhat shortening the overhang of the coils.

The end plates of the Waukegan machine (made of non-magnetic material) are split up into a convenient number of sections, primarily for cheapness, but also for removing flux interleakage with the coils. In the earliest machines brass end plates were often used, and it appears that events are working in a cycle. These end plates, however, were made in one piece, but as they cracked after being in use for a time, cast-iron was substituted. Non-magnetic steel was tried, and present practice with a number of manufacturers is to make the end plates of two materials. Metal of any description near the stator conductors should be avoided, if only to reduce stray losses.

The experimental nature of a high-voltage 60,000-kW 3,000 r.p.m. turbo-generator demands that some developments should first be made on a voltage of 22 kV with a view to the use of higher generating voltages in the near future. A possible output for a unit feeding the grid may be 100,000 kW. This machine, at 1,500 r.p.m., lends itself more especially to higher voltage conditions, and 33 kV appears suitable for turbo-generators of this magnitude.

Any attempt to design machines of large output for low voltages (say, 6,600 V) entails considerable difficulty, as the number of conductors per phase is in inverse proportion to the output and on large machines is very small; hence the designer is faced with a choice of ten or twelve conductors per phase and consequent additional size and weight. With 33 kV we have five times the voltage, which gives a larger range of conductors per phase and very much wider scope in the design. The efficiency of a turbo-generator is so high that modifications from the orthodox design hardly warrant consideration. With higher voltages, however, fresh problems arise, the most important being corona discharge. Another item for consideration will be the stator stampings and the possible use of a low-loss silicon iron, as recently used in America.

Installation Testing. By F. Peake Sexton, A.R.C.S., A.M.I.E.E.

THE testing of an electrical installation in a residence is generally thought to be a matter of grinding the megger. The professional megger grinder may put great faith in his tests and speak very wisely of good and bad jobs, but the real engineer knows the limits and defects of these tests. The best way of explaining these limits is to give an actual example of the testing of and report on a house as ordered by the surveyor to the owner.

The usual megger tests were made, together with a general inspection, and the report was briefly as follows:—

A queer wiring job

There were some minor defects in the garage, in which the I.E.E. Regulations had been broken. A bow cut-out group had been used as a distribution board. Several plugs were not switch controlled. The megger tests showed 100 megohms to earth and 70 between poles. The installation could not be certified as good without a point-to-point examination of the work, which could only be done by taking up floor boards.

This last clause is often inserted in reports as a protection for the inspector against concealed faults.

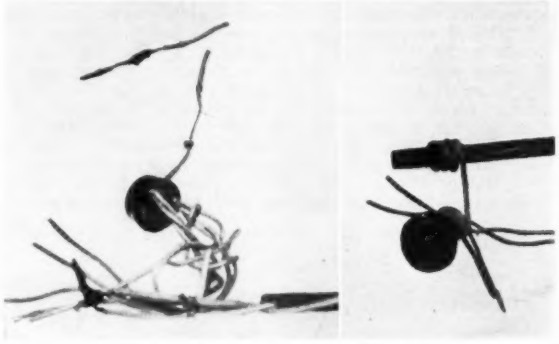
The reply to this report was a telephoned instruction to make an examination of the concealed work at four points. The opening up gave very unsatisfactory results, which rendered it necessary to practically rewire the whole house. The materials had been mainly good, but the work had been horrid. It showed that the man who carried it out had lacked all knowledge of wiring regulations, and had not grasped the first principles of installation work.

The bow cut-out distribution board turned out to be a one-pole affair. The other pole was a bunch of wires joined to the main cable, unsoldered, and badly insulated with tape. The wires were in some cases a very loose fit, and could even be shaken about on the main cable after removal of the tape.

The two points in the kitchen had been omitted from the "distribution board," and were, therefore, directly on the main fuses. The protection of the wood casing system ceased in all difficult positions, leaving the v.i.r. cables alone to reach the points. In some cases the lengths were considerable, and in others the crossing of gas or water pipes seemed to be sufficient excuse for dispensing with the casing.

The lead-covered system was carried out with much misplaced care. Trouble and labour were not spared, as will be seen from what follows. The junction box is shown in the accompanying illustrations. It consisted of an old switch from which the movement had been taken. There were at least three of these on the job. The method of bonding the cables at the box was a general system of twisting the cables together to bring the leads into contact. One method of supporting the box was by twisting one of the lead-covered cables round a convenient pipe. It was a gas pipe in the case shown.

In many cases the cables were single-core lead-covered wires which had been cut short and extended by joining on another wire. The wires were taken for jointing into a metal terminal purloined from an accessory, then screwed up and taped as shown. The leads were then bonded by a fine copper wire (about 24 S.W.G.), as shown in the illustration by a shadowy loop below the point. There were many of these joints about



Junction boxes and bonding

the house. One-point earthing had not been followed, the earthing points being as frequent as they were indiscreet. The rule followed seems to have been, "here's an old pipe, let's earth here." In three rooms the fine earth wire mentioned and shown above had wandered off to compo gas pipes, where in one case it was only a loose twist.

Enough has been said to discourage faith in the megger, but, as there is no better test that is equally easy to apply, it must be used. It should, however, be supplemented by inspection whilst the work is in progress. This inspection, for the safety of both the owner and contractor, should be carried out by an engineer of ability and experience. The only other course is to employ a contractor who is known and trusted.

Electrical Progress in Russia

ACCORDING to the *Monthly Review* of the Moscow Narodny Bank, Ltd., London, the past year witnessed the completion of the first phase of the process of electrifying the Soviet Union. The output of the electric power stations in the country, which in 1931 amounted to 7,700 million kWh, is estimated to reach approximately 12,500 million kWh in 1932. This increase will be made possible as the total capacity of the stations is being augmented during the present year by 1,500,000 kW, and, in addition, eighty-seven additional stations are under construction with a capacity of 5½ million kW.

In the current year it is hoped to raise the capacities of hydro-electric stations as follows:—Dniepr, 272,000 kW; Svir, 24,000 kW; Rion, 36,000 kW; and Dzorages, 22,500 kW. The total capacity of the hydro-electric stations to start operations in 1932, including Dnieprostroy, will be 500,000 kW. At Dnieprostroy only the first six turbines will be started this year, but the whole station is to be completed in 1933.

Electrification of Moscow

The provisions of the recently revised regional plan for the electrification of Moscow and the Moscow district include the extension and capital reconstruction of all existing power stations, the building of hydro-electric stations on the Upper Volga, the canal between Volga and the Moscow river, and on the Moscow-Oka water system.

The programme for 1937, which is the last year covered by the second Five Year Plan, provides for a total generating capacity in all the reconstructed and new electric power stations of 3 million kW, as compared with 790,000 kW at present. By 1942 the aggregate generating capacity is to be raised to 5 million kW, which is 15 times as much as that of the Dniepr power station. For Moscow alone the regional plan provides for the construction in the course of the second and third five-year periods of eleven power stations. Coal and peat from the Moscow region will be used as fuel.

This year it is planned for the first time to establish stations to supply electricity for heating. The capacity of these is estimated at 360,000 kW in 1932. The station of the Elmashstroy Combine is intended to have a capacity of 220,000 kW, and the plant will have a special research laboratory.

Manufacturing Developments

Alongside this progress in electricity production, the manufacture of electrical equipment is developing rapidly. Last year the Stalin turbine works in Leningrad manufactured turbines to the capacity of 702,000 kW, as compared with 420,000 kW called for in the Five Year Plan. Generators for use with the turbines were manufactured at the Electrosila works, also in Leningrad, where the electric motors for three large steel-rolling mills were also built. The Sevcabel works last year produced for the first time a 120,000-V cable and the Svetlana a 50-kW radio valve.

Elmashstroy, the State Trust for the manufacture of electrical equipment, has announced the completion of the scheme for the building of the Ural Electrotechnical Combine, which, it is claimed, will be the largest in the world. The second phase of the process is to begin in 1933, with the starting of the second Five Year Plan.

In addition to the large extension of the electricity supply system, it is proposed to electrify railways to the extent of nearly one-third of all existing lines, the traffic carried on the electrified lines amounting to 65 per cent. of the total traffic of all the railways.

Provision is made for the rapid electrification of the railway system of the Moscow district, and 104 km. of railroads are to be electrified by January 1st next. During the second five-year period the whole of the suburban railway system, covering a radius of 70 km. from Moscow, will be electrified. The main lines to Octobre, Kursk, Nijni Novgorod and Moscow-Don-Basin will be electrified.

Modernising the Tramcar. By J. A. Baker, A.M.I.E.E., M.I.Mech.E.

THE substitution of a bus for a tramcar service may be more costly than the relaying of a worn-out permanent way, as if regard is paid to the onerous financial burdens carried by the tramcar the scrapping of a tramway system may be equal to a rise of 6d. in the £ in the local rates. In many towns the annual loan charges for road foundations and paving on tramway streets equal a 2d. rate, and 1d. can be added for street improvements. The rating of a tramway hereditament is frequently the equal of the product of a 2d. rate, and paving repairs are seldom less than 1d.

The difficulty of keeping the tramways in repair during the war years together with the abnormally high cost of materials caused many transport authorities to assume fallaciously that the bus would be the cheapest unit to operate. The case for the tramcar has suffered from the apathy of the electrical industry generally and from the greed of the suppliers of electricity.

Six years or so ago the tramway undertaking in South Shields had reached that state when bus substitution seemed imminent. No doubt a change could have been made without difficulty, but faith in the tramcar and its future resulted in a modernisation scheme which aimed at making the tramcar as speedy and as comfortable as the bus, but operated on those pre-war economic fares designed to suit the poorest of the community.

The Modernisation Process

All the broken rail joints were electrically welded and ground, corrugation was made to disappear, new crossings were built at the local car shops, and electrically operated double points were installed at the junctions. Miles of side-running trolley wires were converted to centre lines strung from spans, and the overhead junctions, together with the positive and negative feeders, were rearranged to give greater efficiency. Many of the older cars have been scrapped and replaced by good second-hand modern vehicles of the bogie type. A year ago the car-running schedules were speeded up by 10 per cent., and in the near future a further 10 per cent. increase will make the Tyneside Harbour system one of the fastest in the country.

One of the modernised cars at South Shields

The modernised car illustrated is one of six purchased from a Lancashire local authority for £100 each, and £300 was expended in bringing it up to date. A roomy saloon framed in polished oak with birch veneer roof lining is illuminated at night by eight 60-W gasfilled and reflected lamps. Well-sprung rattan cane seats, each fitted with an electric tubular heater, are comfortable and healthy. Padded double floors covered with linoleum make the interior warm and noiseless, whilst patent ventilators and air extractors with roof deodorisers keep the atmosphere clean and free from germs.

The health and comfort of the top deck rider are cared for by means of 11-vane ventilators and electric heaters, and illumination is provided by ten 60-W gasfilled lamps. Transverse seats are made of mahogany and birch, and are polished and arranged on the "two and one" principle so as to give greater knee room, added comfort, and a wide aisle. To produce a feeling of security, glass-fronted boxes complete with emergency tools and ambulance requisites are placed in convenient positions in the saloon, and fire extinguishers are carried in brackets on the platform vestibule pillars. All bell circuits, electric horns, fog lamps, wind screen wipers, direction indicators, and green "slow" and red "stop" traffic lamps are electrically operated from a 12-V circuit.

Mr. J. Austin Baker is general manager and engineer of the South Shields Corporation Tramways and Motors

The swing bolster bogie trucks are propelled by ventilated interpole motors, arranged to operate with an auto-shunt 40 per cent. field diverter, a fool-proof device which increases the free running speed of the car from 5 to 7 m.p.h.

Of the forty-five cars at South Shields fifteen are of the modern bogie type, and in the near future all of them will be brought up to the style and finish of the car depicted. The exteriors of the de-luxe South Shields cars are made attractive by a crimson-lake and white finish; red diamonds painted on the dashes denote a modernised vehicle. The unique local practice of naming the cars gives each of them an individuality which a number cannot attain. Thus on the car illustrated will be seen the name of James Cochran Stevenson, who was M.P. for South Shields from 1868 to 1895.

Worth-while Expenditure

My experience is that the work entailed in the modernisation of a tramway system is well worth while. Apart from the loss to the borough finances if buses had been substituted, efficient and up-to-date tramways appeal to local pride. Modernisation and speed have resulted in reduced operating expenses; for the past twelve months the working cost has been 11.12d. per car-mile. The undertaking pays its way and is self-supporting, while passengers may ride 1¼ miles for 1d.

The foregoing details show that the tramcar is not so obsolete as some of its detractors would like the uninitiated to believe, and that the smallest of local transport authorities can possess up-to-date tramway systems if faith in the tramcar is well founded, but constant attention to detail, improvements, and lower costs are as important now as they were six years ago.

Electrical Housecraft

THE Glasgow and District Branch of the Electrical Association for Women has just concluded a five-days' summer-school course of electrical housecraft for women at the Glasgow and West of Scotland College of Domestic Service. This is the first venture of the kind in Scotland, and the hon. secretary, Miss R. F. Kennedy, is very satisfied with the result. It is likely that other towns in Scotland will run similar courses which may not be confined to women as this one was. The scheme was arranged by the E.A.W. in conjunction with the E.D.A., the Scottish Lighting Service Bureau, and the College of Domestic Science.

The subjects covered were:—"Women's Interest in Electricity," by Mr. E. M. Hood (E.D.A.); "The Application of Electricity in the Home," by Miss Mary Andross, B.Sc.; "Colour Lighting and Home Lighting," by Mr. T. Catten (E.L.M.A.); "Plug Points," by Mr. Allan Arthur, M.I.E.E.: "Domestic Appliances used from Plug Points," by Miss Andross; "The Electric Cooker and its Parts," by Siemens Bros., Ltd.; "Quickness and Economy of the Electric Cooker," by Miss Mary Mackirdy; "Electric Vacuum Cleaning," by Edison Swan Electric Co., Ltd.; "Refrigeration," by Mr. W. P. Rae; "Electric Washing Machines, Ironing Machines and Irons," and "Laundry Work," by Miss Speir; "Equipment of a Cookery Centre in Domestic Science and Equipment for Cooking in Institutions, Canteens, &c.," by the General Electric Co., Ltd.; "Equipment for Nursing Homes and Clinics, Ultra-Violet and Infra-Red Rays," by Mr. Robert Hamilton; "Recent Advances in Medical Electricity," by Miss M. G. Boyd; "Specimen Lecture on Electric Cookery," by Miss Mackirdy; and "Tariffs," by Mr. Hood.

The course was well attended throughout, the students consisting of teachers, nurses, housewives and cooks. A cinema film was made of one of the cookery courses; this will be used for demonstration purposes later.

Radio Equipment on the "Georgic"

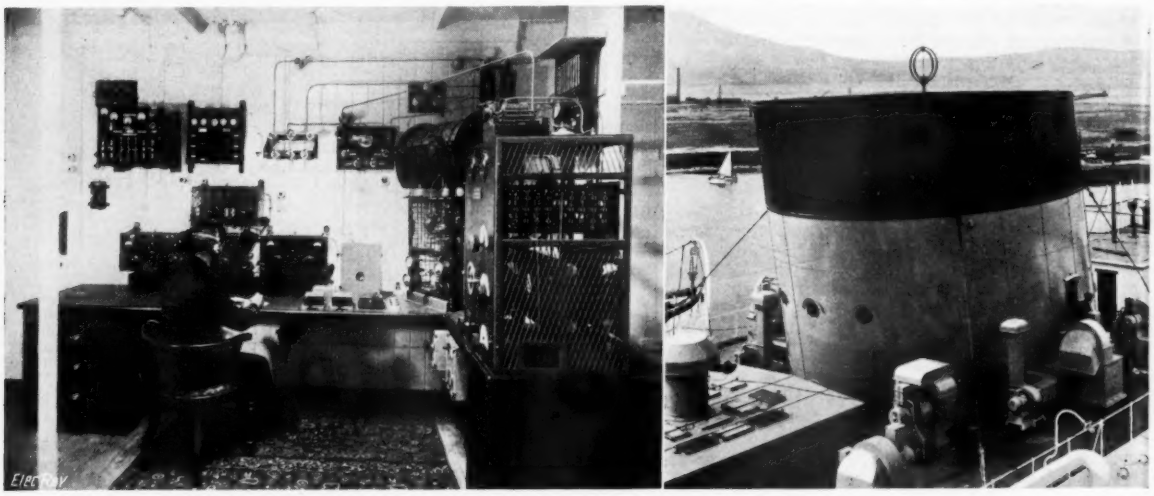
A new use for a dummy funnel

THE new White Star motor liner *Georgic*, which was recently completed at Messrs. Harland & Wolff's yard at Belfast, is fitted with a complete installation for long distance wireless telegraph communication on long and short waves, in addition to the equipment necessary to comply with regulations for the safety of life at sea, which includes an emergency transmitter and lifeboat wireless equipment. The ship also carries a Marconi direction finder, which is now regarded as a part of the normal navigational equipment of modern ships.

The main wireless transmitter for medium and long waves is a 1½-kW valve installation, type M.C.13a, which transmits by i.c.w. on the wave band 600-850 metres, and by c.w. on the wave band 1,875-2,750 metres. This transmitter covers all telegraph communication up to distances of about 2,000 miles. When longer ranges than this are required short waves are used, and the type 376 transmitter, using similar power, is brought into operation.

Receivers corresponding to these transmitters are carried; and, in addition, facilities are provided for receiving on wavelengths not covered by the ship's transmitters but which are used by stations sending out news, time signals, weather reports, &c.

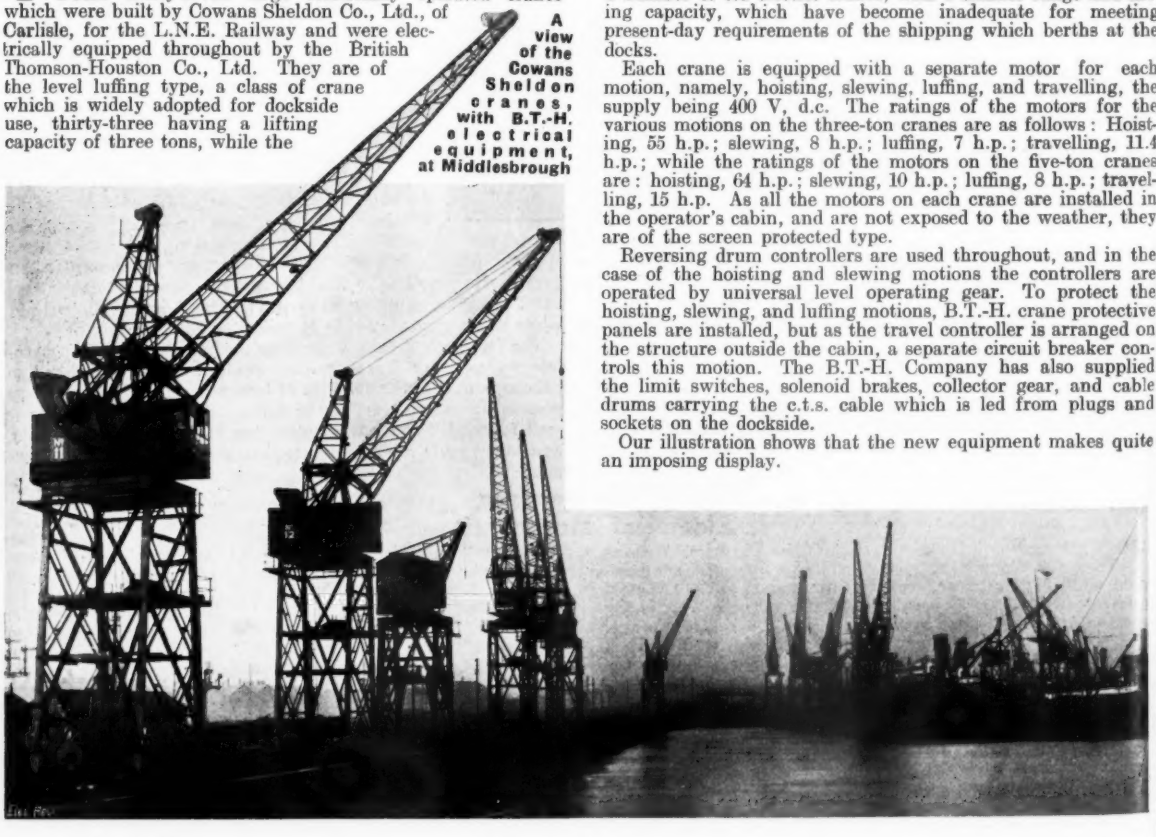
An unusual feature is that the wireless room is in the dummy funnel. The Marconi direction finder is also in this room, and the fixed aerial system is mounted on the roof of the cabin with the loops just clearing the open top of the funnel. The whole system is thus well screened by the dummy funnel from unwanted interference by the ship's electrical equipment, the funnel providing a metallic screen in addition to the screening incorporated in the construction of the apparatus.



The wireless room on the "Georgic" is situated inside the dummy funnel. In the right-hand picture can be seen the direction finder aerial projecting from the roof; the entrance to the room is on the right of the funnel

Large Electric Dock Cranes

THERE have recently been installed at Middlesbrough Docks thirty-seven large electrically operated cranes which were built by Cowans Sheldon Co., Ltd., of Carlisle, for the L.N.E. Railway and were electrically equipped throughout by the British Thomson-Houston Co., Ltd. They are of the level luffing type, a class of crane which is widely adopted for dockside use, thirty-three having a lifting capacity of three tons, while the other four can handle five tons. The cranes are to replace a number of old electric cranes, with a smaller range and lifting capacity, which have become inadequate for meeting present-day requirements of the shipping which berths at the docks.



A view of the Cowans Sheldon cranes, with B.T.-H. electrical equipment, at Middlesbrough

Each crane is equipped with a separate motor for each motion, namely, hoisting, slewing, luffing, and travelling, the supply being 400 V, d.c. The ratings of the motors for the various motions on the three-ton cranes are as follows: Hoisting, 55 h.p.; slewing, 8 h.p.; luffing, 7 h.p.; travelling, 11.4 h.p.; while the ratings of the motors on the five-ton cranes are: hoisting, 64 h.p.; slewing, 10 h.p.; luffing, 8 h.p.; travelling, 15 h.p. As all the motors on each crane are installed in the operator's cabin, and are not exposed to the weather, they are of the screen protected type.

Reversing drum controllers are used throughout, and in the case of the hoisting and slewing motions the controllers are operated by universal level operating gear. To protect the hoisting, slewing, and luffing motions, B.T.-H. crane protective panels are installed, but as the travel controller is arranged on the structure outside the cabin, a separate circuit breaker controls this motion. The B.T.-H. Company has also supplied the limit switches, solenoid brakes, collector gear, and cable drums carrying the c.t.s. cable which is led from plugs and sockets on the dockside.

Our illustration shows that the new equipment makes quite an imposing display.

New Showrooms at St. Pancras

AS intimated in our last issue, the Mayor of St. Pancras, Sir Alfred Davies, C.B.E., officially inaugurated the new automatic sub-station in Arlington Road and the new showrooms in Camden Road of the borough's electricity undertaking on Friday last week. A feature of the proceedings was a short speech by Councillor F. Hewson, chairman of the Electricity and Public Lighting Committee, who paid a high tribute to the work of Mr. R. Lee, chief electrical engineer.

The new showrooms of the St. Pancras Electricity Department

The sub-station was described last week (p. 83). The showrooms occupy the whole of the ground and basement floors, about 1,430 sq. ft. of the premises at Nos. 9 to 15, Camden Road. The frontage is devoted to five display windows and the main entrance which leads into a large reception room.

On the left of the reception room are administrative offices and on the other side is an account-paying office and waiting room, a corner of which is equipped for water-heating demonstrations. The showrooms are to be heated by low-temperature electric hot-water radiators, with thermostatic control.

In the basement a small room is to be equipped, it is hoped, as a period room ("Dickens") for the display of lighting fittings. In the large demonstration kitchen in the basement, tiled throughout, the equipment—cooking, water heating, &c.—is all arranged along one wall, and is lighted by projector lamps concealed from the visitors' view behind a ceiling beam. This room will seat sixty, and is heated by tubular equipment.

Two other rooms in the basement, apart from cloak rooms, &c., will serve for supplementary demonstration work and storage. An interesting point is that the whole of the wiring was carried out by the Consumers' Department under the supervision of Mr. J. H. Bryan, consumers' engineer.

Water Power in the Dutch East Indies

THERE is about 6.6 million h.p. of potential water-power available in the whole of the Dutch East Indies, but it is badly distributed having regard to the requirements of the various islands, according to an article in a recent issue of the *Far Eastern Review*.

For example, Java, which is the most densely populated and the most highly developed of the islands, possesses only 600,000 h.p., the greater part of which is in West and Central Java. Of the other islands, Sumatra and Borneo each have about two million h.p., Celebes about one million, and the remainder about one million h.p. between them. All these great sources of power are practically unused at present. The Government controls the exploration survey, and development of water-power and has since 1917 concentrated them in a special Water Power and Electricity Division.

West Java is the most developed. The light and power works of Batavia and its environs, as well as the electrified railways in the Batavia district, have, since 1925, been supplied by means of a 70,000-V line from the Government Oubroug power-station on the Tjijatih river near Tjibadak; this station, which is equipped with two 5,400-kW turbo-generators, also supplies Buitenzorg and Sukaboemi. Distribution in Batavia is entrusted to the "Ned.-Indische Gas Maatschappij," and in Buitenzorg and Sukaboemi to the "Gebeo," a mixed public electric utility company. A second power station, known as the Kratjak on the Tjianten, with two 5,500-kW sets, will be connected with this system in Buitenzorg. For the supply of the plateau of Bandoeng there is about 20,000 kW of water-power plant. At present the Division is engaged in constructing new transmission lines and sub-stations, which are intended to open up new areas.

In Central Java, on the river Tuntang, is the 4,000-kW hydro-electric Sousoukan station belonging to the Allgemeene Nederlandsch-Indische Electriciteits Maatschappij (Aniem), erected in 1913 to supply Samarang and Salatiga. The Government power station of Giringan on the river Tjatour near Madioun is equipped with two 740-kW sets and supplies energy only to the Government railway workshops at Madioun and the municipal electrical services of that town. In East Java, with a view to supplying the provinces of Sourabaya, Kediri, and Pasuruan, the Mendalan power-station, equipped with three 5,500-kW sets, was recently opened on the river Konto. It is operated by the Nederlandsch-Indische Waterkracht Exploitatie Maatschappij (Niwem), which is a combine of the Government and the "Aniem." The latter owns electrical works in this area. There are projects in preparation for the supply of power in Central and Eastern Java.

The same degree of progress has not yet been reached in the Outer Islands. Only one Government hydro-electric station has been erected, namely, the Teis plant on the river Ketahun (Bencoolen)—about 1,500 kW.

A group at the opening of the new St. Pancras sub-station

A New 33-kV Isolator

A NEW design of isolator (Type IH) has been introduced by Messrs. Ferguson, Pailin, Ltd., for indoor or outdoor service up to 300 A at 33 kV. The single type is fitted with incoming and outgoing cable boxes, but a double type is also available equipped with a tee-off for service on a ring main, or as a busbar selector.

The switch is manually operated and non-automatic, and has three positions: incoming cable connected directly to feeder, incoming cable disconnected from feeder, and incoming earthed and feeder terminals free.

Separate operating rods are provided for the isolator switch and the earth switch so as to make it impossible to switch the isolator from the "on" directly to the "earth" position.

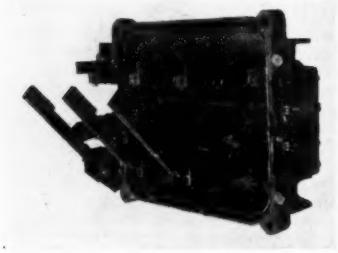
Interlocks are provided to prevent: (1) the removal of the tank until the isolating switch is "off" and the earth switch "on" (for double-switch isolators, both isolators must be off and earthed before either tank can be lowered); (2) the earthing of the isolator until the switch is in the "off" position; and (3) the switching in of more than one of the two switches of a double-switch unit used as a simple isolator or busbar selector.

Constructional Features

The switch top plate is of heavily ribbed cast iron, domed to provide liberal expansion space. It supports the bushings, contacts, operating gear, and the tank, and is itself supported by two channel iron members which rest upon the main framework.

For the terminal box fabricated sheet steel is used, supported on the main frame by two channel-iron members above the top plate. The main structure of the terminal box on the double type is divided into three compartments, two of which serve as cable boxes while the central compartment accommodates the tee-off connections. A fourth compartment, exterior to the main structure, serves as a cable box for the tee-off.

The rectangular switch tank is of fabricated sheet steel with rounded corners, and is supported from the top plate by four drawn-steel downrods. The rim of the tank fits into an annular groove in the top plate thus forming a gas- and oil-tight joint. Tank lining and phase barriers consist of "Elephantide." Wheeled channel-iron carriages provide for tank transportation. A worm and wheel drive, operated by a detachable handle, raises and lowers the tank.

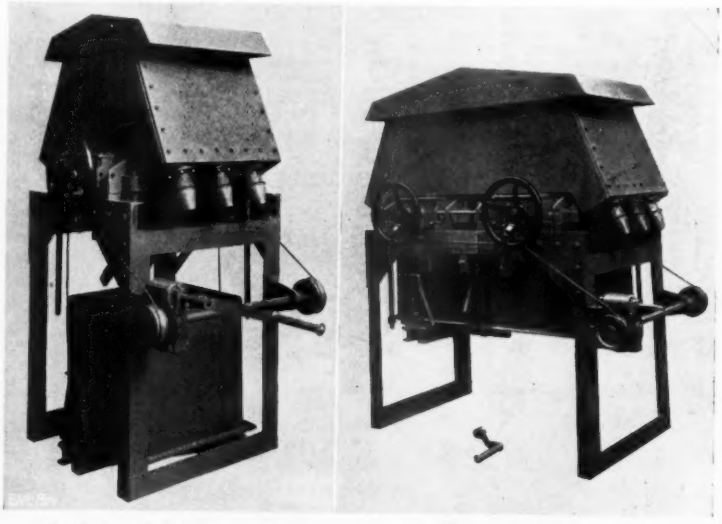


Contacts and top plates, isolator earthed

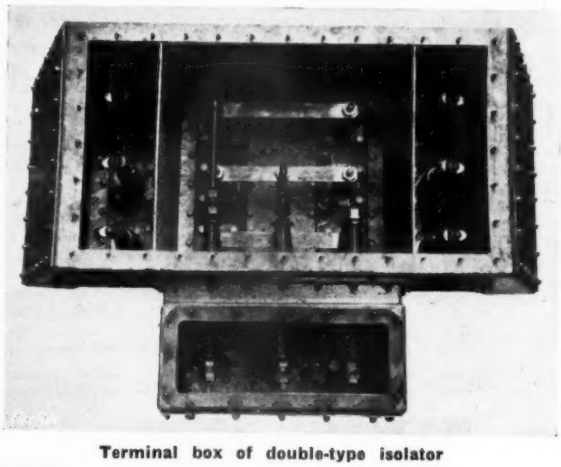
The feeder contacts are of the copper-finger pattern and provide the "on" position of the isolator. The fingers are slightly flared, and two are provided for each pole to receive the dual-blade moving contacts. The earth contacts have flared jaws and are operated by a separate rod drive, to which they are connected by strapping pieces in horse-shoe formation.

Flexible copper braid connects the contacts with earth terminals in the top plate which can in turn be connected to the earth bar. The moving contacts are double-bladed copper knives, aligned with the feeder contacts. Spring controlled q.b. arcing tips prevent burning of the main contacts; these are easily and inexpensively replaced.

The isolator is operated by means of a hand wheel through direct rotary motion. Two rod drives are provided, one for the isolating switch and the other for the earth switch. Either the isolator or the earth switch may be padlocked in any desired position.



Single-type isolator with tank lowered, and (right) double-type isolator



Terminal box of double-type isolator

Indian Electrical Notes (FROM OUR INDIAN CORRESPONDENT)

IN addition to a scheme prepared by the Madras Corporation, a broadcasting service is contemplated for the Madras Presidency. This provides for a short-wave transmitting station situated at a suitable place such as Bangalore, with five relay stations situated, say, at Bezwada, Madras, Madura, Calicut and Bangalore. These transmitting and relaying stations, together with 1,000 radio receivers suitable for audiences of 150 to 200, will involve a capital expenditure of Rs. 5 lakhs. If the Madras Government launches on such a scheme, all the municipalities can be counted upon to participate and to install wireless receivers in all the schools under their control and to maintain them at their expense. The department will be under the control and direction of one chief engineer with an honorary advisory board to assist him from time to time.

Slow Broadcasting Progress

The reasons why the Indian broadcasting service is not attracting a sufficient number of listeners are that the people of India are comparatively poor and cannot afford to buy wireless sets; and the few that can afford to do so find it difficult to attend to minor adjustments, with the result that the receiving sets hardly ever work satisfactorily. Radio merchants do not, and perhaps cannot, render the necessary service.

A Lamp Manufacturing Project

India imports electric lamps to the extent of Rs. 58 lakhs annually, and now a Bengali engineer who recently returned from England after learning the entire technique of the industry there has formed a company for the manufacture of electric lamps in India, which is stated to be the first venture of its kind in India on a commercial scale.

Rural Electrification in Mysore

The efforts of the Electricity Department of Mysore to make power available for agricultural purposes are greatly appreciated by the ryots, and more than 250 irrigation pumps are now in service. The demand for power is increasing, and to supply this a scheme for the construction of hydro-electric works at Mekadatu is in view, while another scheme to harness the Jog falls for the supply of power to the northern part of the State has been under investigation.

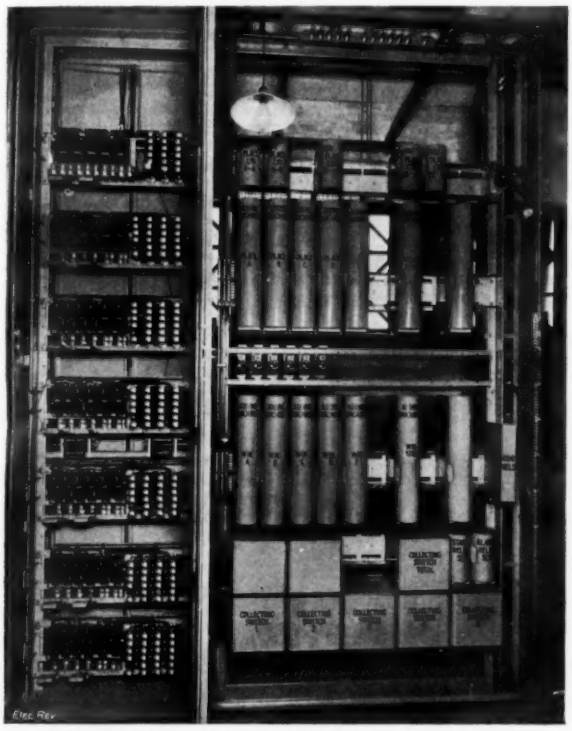
Power for Bombay Mills

The Bombay Millowners' Association appointed a Committee some time ago to consult technical advisers and to see if it was possible to reduce power costs. As a result of the labours of this Committee it was demonstrated that substantial savings could be effected if mills installed their own power plant in preference to taking power from the Tata Hydro-Electric Power Supply Companies. The Association thereafter approached the Power Companies for a reduction in rates and after protracted negotiations an appreciable reduction in rates for bulk consumers was obtained. The net result of this reduction over the industry as a whole in Bombay was a saving of about Rs. 10 lakhs of rupees per annum.

An Electric Totalisator at Liverpool

IT is claimed that the totalisator recently installed at Breck Park greyhound racing track, Liverpool, is the most advanced in electrical design that has yet been built. The outstanding feature is that it displays progressive dividend forecasts on every dog at half-minute intervals throughout the wagering period. In other words, it faithfully registers the fluctuating pulse of the field in just the same way as the human "bookies" shorten or lengthen their odds in accord with popular favour. This totalisator, which has been built by the Automatic Electric Co., Ltd., has cost about £10,000.

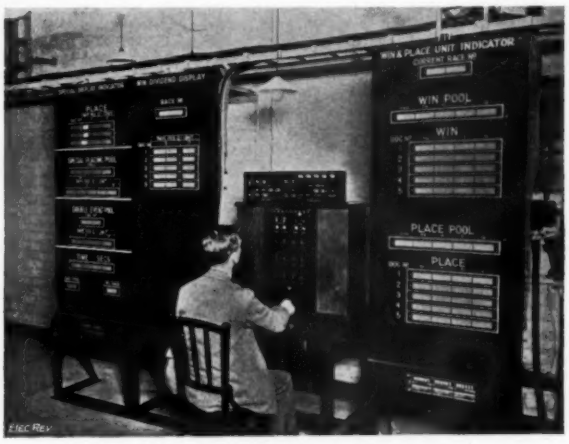
Wagers are collectively accepted from ticket machines on all parts of the course by the individual dog and total adding machines and are displayed on a miniature indicator in front of the control officer. The calculating apparatus functions on the principle of the Wheatstone bridge, *i.e.*, the resistance of one of the ratio arms is fixed, whilst the resistance of the second ratio arm is made to vary in proportion to the unit bets on each dog. The resistance of the third arm of the bridge likewise varies in proportion to the total bets on all the dogs, whilst the resistance of the fourth arm is automatically introduced to balance the bridge, by means of a rotary selector. One bridge is used to record the bets placed upon each dog.



Interior of the apparatus; calculating equipment on left

The centre points of each bridge are taken to individual single valve d.c. amplifiers. The amplifier circuit is also arranged in bridge formation. The d.c. impedance of the valve forms one arm, the anode resistance feed forms the second arm, and the non-inductive resistances, of equal value, form the third and fourth arms of the bridge. A standard Strowger automatic telephone relay is connected across the centre points of the amplifier bridge in place of the usual galvanometer. This relay controls the working of the rotary switches, which point to the marked contacts and control the indicators displayed to the public.

The percentage deduction for administration is automatically secured by making the resistance of the total arm less in value by the required percentage than the resistance of the "dog" arm, *i.e.*, if 5 per cent. is to be deducted from the pool, then if 5 ohms is chosen to represent each unit value of the dog arm 4.75 ohms represents the unit value of the total arm. The procedure generally is that the dog and total rotary switches hunt for the positions marked by the adding machines; in so doing they introduce a definite value into each arm of the bridge. Every thirty seconds an impulse is given to start calculating. The balancing switch starts hunting and in so doing varies the resistance of the fourth arm of the bridge and incidentally alters the bias on the grid of the amplifying valve. The relay in the amplifier bridge is held operated, allowing the balancing switch to hunt. When a balance is obtained the relay releases and stops the balancing switch. At the same time the balancing switch marks the particular contact on one of its auxiliary banks to which the indicator boxes hunt to display the dividend to the public. Immediately the winning dog is known the equipment recalculates to indicate the final dividend.



The control boards and panels

The equipment operates at 50 V and the lamps at 100 V. Should a fault develop in any piece of mechanical apparatus, it can be instantly replaced. There is a complete system of electro-mechanical checks and the entire totalisator is in charge of a single official. The tote indicator towers above the surrounding structures and is floodlighted after dark.

The Advantages of Railway Electrification

IN the course of a paper which he read in Paris at the International Congress of the Union of Producers and Distributors of Electricity, Sir Philip Dawson pointed out that practically all sections of the British railways could be supplied with electricity directly from the national transmission grid.

He maintained that electrification would accelerate the average speed of local goods services by 33 per cent., the cost per train mile being 59 per cent. of that of steam. Fast long-distance goods could be accelerated by 25 per cent., the cost of operation being 78 per cent. of that of steam. Stopping local passenger trains could be accelerated by 25 per cent., the cost of haulage being 55 per cent. of that of steam. Main line express passenger trains could be accelerated slightly, the cost of haulage being 64 per cent. of that of steam. These figures took account of the cost of repairs and maintenance of the contact and distribution systems and sub-stations, but not of the capital expenditure on them.

The cost of repairs, renewals, and maintenance of electric locomotives and tractors was 40 per cent. of that of steam engines. The total cost of locomotive haulage, added to that of guards and train crews, was 27 per cent. of the total annual expenditure on British railways. Under favourable conditions electric haulage would save one-third of this amount, or nearly 10 per cent. of the total annual expenditure, representing from 1 to 1.5 per cent. on the total railway capital, so that dividends might be increased. Electrification of all the railways should show a return of from 7 to 10 per cent. on total capital expenditure.

The cost of conversion employing contact lines would be divided as follows: Running, 31 per cent.; sidings, 11 per cent. (battery and Diesel-electric locomotives might be used for some shunting work); distribution, 5.5 per cent.; locomotives, 48 per cent., and alterations 4.5 per cent.

If electrification were started immediately it could be completed in 1950, by which year the railways would absorb one-fifth of the total output of the grid and their maximum demand would be 10 per cent. of the total maximum demand on the grid. The m.d. on the d.c. side would be 1.5 million kW, the load factor 50 per cent., and the d.c. output 6,500 million kWh annually. With a.c. costing 0.25d. per kWh at selected generating stations d.c. at the track should cost 0.55d. per kWh. Railway supply would react very favourably on the cost of general grid supplies.

Sir Philip Dawson

New Books

National Electrical Code Handbook. By A. L. ABBOT. Pp. 473; illus. London: McGraw-Hill Publishing Co., Ltd. Price 18s.

This is a new wiring reference book explanatory of the most recently issued edition of the American National Electrical Code. At the same time it is an excellent treatise on the whole art of installation work as practised with official approval in the United States, for the Code is more comprehensive in its scope and exact in its requirements than our I.E.E. Regulations for the Electrical Equipment of Buildings.

Although there are astonishing differences in practice between American wiring methods and ours, the British reader of this painstaking and thoroughly conscientious amplification of the American code may wonder whether we are not treating the problems of a.c. wiring rather too lightly in this country. It indicates, for instance, that in the matter of safe domestic pressures we have more confident views than are now accepted in the United States and there are apparently no equivalents there for some of the inflammable and short-life wiring systems which even our most reputable cable and accessory makers now supply for the subsidised class of house in England. On the other hand, there are plenty of indications in the book that some accessories acceptable across the Atlantic have often that mass production appearance repellant to the more conservative English user.

Although installation methods, demands, materials, regulations and nomenclature differ in America widely from our own, there is abundance of material in this comprehensive treatise which will interest and instruct the English installation engineer and which may suggest improvements in our present methods.

Rewinding and Connecting Alternating-current Motors. By D. H. BRAYMER and A. C. ROE. Pp. xv+372; figs. 228. London: McGraw-Hill Publishing Co. Price 21s.

To judge from the number of publications by these American authors, either separately or with others, one may conclude that they have made a life's study of the subject of armature winding in all its practical branches. Whether recent experience in Great Britain during the change-over from 25 to 50 cycles would indicate rewinding to be a matter of vast importance is open to doubt, for in numerous instances the ousted motors were replaced by new ones. The problem, however, is a wide one apart from policy, because a motor drive often entails much more than the mere motor.

This book contains much information compiled from practical experience that is hard to find elsewhere, but English readers will doubtless deprecate so much concentration on 60- and 25-cycle machines—the American standards. In the chapters on winding connections, the reader will find much useful and practical data on all kinds of windings and end-connectors—lap and wave, multi-speed, single- and double-layer, turbo-stator, and so on. In the chapter on causes of noise and methods of suppression, the authors might have said more, though possibly too much weight should not be attached to equalisers, owing to their restricted application. We should also have welcomed more information on the merits of the different constructions of cage windings.

Meter Engineering. By J. L. FERNS. Pp. 270; figs. 168. London: Sir Isaac Pitman & Sons. Price 10s. 6d.

Our principal criticism of the present work, which is successful, on the whole, as a concise treatment of its subject, is that the author has not made the best use of his space. The first half of the book is concerned with the theory and description of some typical and special d.c. and a.c. meters, time switches, and instrument transformers. The second part of the book is devoted to the practical testing of this apparatus and giving typical test-sheets. This part of the work should prove very useful, because it is somewhat neglected by writers on metering. Then follows the testing of shunts and transformers, the standardising of instruments, installation, maintenance and the treatment of disputed accounts.

With the book as a whole we feel somewhat disappointed, particularly with the latter part of the second half, which lacks breadth of treatment. If it contains all that the author has to tell us on the subjects, the space occupied could have been more profitably used to expand the subject matter of the first part. Again, the space devoted to four appendices on integration, vectors, trigonometrical identities, and the slide rule would have been better employed in the augmentation of the main subject matter, or in dealing more fully with the testing instrument transformers, while Fig. 141 B. requires some more detailed explanation as to how the phase angle O is determined in a reasonably good transformer with the connections shown. The author, like many other writers of recent technical books, has made generous use of contractions to initial letters, a practice which should not be encouraged.

Nevertheless, Mr. Ferns has produced a book on original lines which should prove of value to those engaged in the work of testing and adjusting supply meters.

* * *

Shorter Notices

Sir Isaac Pitman & Sons, Ltd., send us a list of books published by them which they consider should be useful to the electrically minded amateur. The list includes the following:—"Practical Electric Light Fitting," by F. C. Allsop (7s. 6d. net); "Electric Wiring, Fittings, Switches and Lamps," by W. Perren Maycock, revised by Philip Kemp (10s. 6d. net); "Electrical Housecraft," by R. W. Kennedy (2s. 6d. net); "Mechanical Refrigeration," by Hal Williams (20s. net); "Modern Radio Communication," by J. H. Reyner (5s. net); "Wireless Manual," by Capt. Jack Frost (5s. net); "Television: To-day and To-morrow," by Sydney Moseley and H. J. Barton Chapple (7s. 6d. net); "Accumulator Charging," by W. S. Ibbetson (3s. 6d. net); "Clocks and Watches," by G. L. Overton (3s. net); "Electric Bells and all About Them," by S. R. Bottone, revised by C. Sylvester (3s. 6d. net); "Electric Wiring and Contracting," by H. Marryat (seven vols., 6s. net each); "Fractional Horse Power Motors," by A. H. Avery (7s. 6d. net); "Small Electric Motors," by E. T. Painton (2s. 6d. net); "Electro Motors: How Made and How Used," by S. R. Bottone, revised by C. Sylvester (4s. 6d. net); and "Switching and Switchgear," by H. E. Poole (2s. 6d. net).

British Overseas Electrical Trade in June

SUBSTANTIAL increases both in imports and exports of electrical goods and machinery are recorded in the Board of Trade statistics for June analysed below.

A satisfactory feature is the increase of £33,543 in electrical machinery exports as compared with June, 1931, the advance being mainly due to a rise from £72,408 to £127,414 in the purchases of European countries. Shipments to South Africa (£47,436) and British India (£64,992) also showed increases of £8,284 and £5,353, respectively, but there were considerable declines in the exports to Canada (£8,202 against £16,853) and "other countries" (£61,451, against £85,116).

Compared with May, 1932, the electrical machinery export figures are £11,866 higher, owing largely to increases of £33,577 and £16,962 in the purchases of European countries and "other countries." Exports to South Africa showed a decline of £23,965.

	EXPORTS.			IMPORTS.			RE-EXPORTS.		
	Electrical exports for June, 1932.	Inc. or dec. as compared with May, 1932.	Inc. or dec. as compared with June, 1931.	Electrical imports for June, 1932.	Inc. or dec. as compared with May, 1932.	Inc. or dec. as compared with June, 1931.	Electrical re-exports for June, 1932.	Inc. or dec. as compared with May, 1932.	Inc. or dec. as compared with June, 1931.
Insulated wires and cables ..	£94,312	− £6,192	− £3,304	£19,176	+ £5,666	− £44,830	£48	+ £35	− £980
Electric carbons	1,248	+ 36	+ 706	6,558	+ 2,687	− 6,074	16	− 191	− 190
Arc lamps and searchlights ..	840	+ 665	+ 516	49	+ 7	+ 49	—	—	− 4
Incandescent lamps	35,052	+ 6,899	+ 1,155	12,731	+ 5,865	− 18,746	454	+ 128	+ 96
Other lighting apparatus ..	23,819	− 1,296	− 823	13,971	+ 343	− 36,673	244	− 4	− 262
Batteries and accumulators ..	52,579	+ 10,217	+ 10,426	10,101	+ 6,972	− 25,318	1,654	+ 1,549	+ 114
Meters and instruments ..	21,898	− 2,246	− 951	21,420	+ 41	− 1,548	541	+ 177	− 223
Unenumerated goods and apparatus	72,060	− 4,766	− 51,577	41,195	+ 4,601	− 43,437	1,936	− 2,830	− 2,958
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cables (not submarine)..	22,302	+ 8,648	− 898	507	+ 425	− 883	—	—	− 71
Submarine telegraph and telephone cables	—	− −	− 349	—	—	—	—	—	—
Telegraph and telephone apparatus	152,767	+ 14,140	− 38,869	43,962	+ 6,290	− 52,510	3,422	+ 1,371	− 3,126
Electrical Machinery—									
Railway and tramway motors	10,081	− 3,999	+ 5,889	—	—	—	—	—	—
Other motors and generators	92,409	− 14,723	− 37,815	—	—	—	—	—	—
Unenumerated electrical machinery..	239,825	+ 30,588	+ 65,199	96,255	+ 10,318	− 35,685	8,316	− 3,269	− 2,438
Total..	£819,192	+ £37,971	− £50,395	£265,925	+ £43,215	−£265,655	£17,331	+ £3,504	− £10,042
Decreases for the first six months of the year.. ..	Exports. £1,529,070			Imports. £1,185,459			Re-exports. £61,344		

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Britain's Electrical Future

Mr. Purse's letter in your issue of July 8th reminds me that shortly after the passage of the 1919 Act I wrote an article for the ELECTRICAL REVIEW briefly explaining the effect and provisions of the Act, concluding by pointing out that it gave the supply industry an opportunity for organising itself on co-operative lines for the public and its own benefit; and that if it failed to do so, something would happen to it, not so agreeable.

It did fail, with the exception of two or three areas where J.E.A.s " within the meaning of the Act " were set up; and something has happened to it, the loss of control of generation, as it will be before long. Mr. Purse is quite right in pointing out that it is not too late to save distribution, by establishing J.E.A.s generally, but it soon may be too late.

Streatham, S.W.16, *July 14th*. HENRY M. SAYERS.

E.H.P. Switchgear

I have been both interested and amused by the mild controversy which the very excellent article by Mr. Yelland has provoked in your columns during the past few weeks.

I wonder if it has ever occurred to your readers that the question of " proving " the emergency rupturing capacity of e.h.p. oil switches is of very recent origin, and one might be tempted to think that it has been raised in the selling interests of a few of the larger switchgear firms who, with unlimited resources in this country or abroad, have set up, or obtain access to, " proving plant," which for various reasons may be denied their smaller and less fortunate competitors.

Upon reflection let it be remembered that over the past ten years or so super power stations and " lesser fry " have installed, used, and will continue to use with perfect safety e.h.p. switchgear of high rupturing capacity which has not been " proved," except by the surest test—actual working conditions.

On the other hand if the general consensus of opinion is that e.h.p. switchgear should be tested and proved then why not, in fairness to all manufacturers both large and small, treat the matter nationally and provide a central " proving establishment " which if run on sound lines could be made self-supporting.

Wallington, *July 11th*, 1932. B. N. D.

Mr. Mackay's letter in your issue of June 24th is of special interest because, so far as I am aware, he is the only British supply engineer who has carried out breaking capacity tests with appreciable short-circuit power. His statements are a confirmation of the fear recently expressed, that many untested breakers would not rupture powers up to their assigned rating if they were subjected to proving tests.

I expected that your correspondents who have claimed that rupturing tests are not necessary would have commented on Mr. Mackay's letter. The truth is sometimes unpalatable, but this additional evidence ought to satisfy complacent supply engineers and your anonymous correspondents who think that all is well because service troubles have been rare.

The statement that most designers can produce an oil breaker which will perform satisfactorily the services needed, whether it be 50,000 kVA or 1,000,000 kVA, is one very easy to make, but most difficult to substantiate, and more than one manufacturer may have held this belief until experience such as that revealed by Mr. Mackay's tests or factory short-circuit testing has enlightened him.

Reporting on a recent breaker failure which caused considerable damage to property, the Home Office inspector states: " As the switchgear failed under the critical test it is possible that the nominal rating was too optimistic." Supply engineers, as well as manufacturers, only require a nasty rupturing failure to make them alive to the dangers which are being incurred when using untested breakers. Failures do occur causing highly dangerous conditions, but the minimum amount of publicity is given to these happenings, with the result that some engineers who have never had the unfortunate experience are inclined to doubt the danger of such failures.

The writer shares in the disappointment at the inadequate testing facilities in this country and has advocated an increase of such facilities for many years. There is a dual responsibility for our present position, first on the part of the supply authorities, who in considering tenders are not prepared to recognise as an item of cost the expense incurred by the manufacturer in carrying out rupturing tests, which, as I previously stated, may represent as much as 20 per cent. of the manufacturing costs; and, secondly, on the part of the financial directors of manufacturing organisations who have failed to carry out the recommendations of their technical engineers. Their defence is difficult to counter from a commercial point of view so long as a paper estimate of rupturing ability is considered to be of the same value as oscillograph records of actual tests obtained at high cost. Those engineers who have had experience on rupturing tests would be failing in their duty to the industry if they did not point out the danger to life and property involved in this matter.

Higher Openshaw, Manchester, *July 16th*. S. FERGUSON.

The new Lambeth Bridge which was opened by H.M. the King on Tuesday last: Left, one of the double standards; right, a night view of the bridge. (*See page* 138)

Electricity on the Poultry Farm

An article appeared in your issue of June 24th entitled " Electricity on the Poultry Farm." Statements were made therein regarding electric brooders which, besides being merely a matter of opinion, were unduly damaging to electric lamp brooders (i.e., brooders depending for heat on electric lamps giving off luminous radiant heat rays).

At the moment there is a brooder of this type on the market which I think is the only one of its type which has been accepted as a patent; this not only gives entire satisfaction, but is in many cases rapidly superseding the type of electric brooder described in your article, which is regarded in many poultry circles as being slightly out of date. The reasons for this are numerous, depending upon the many advantages of electric lamps for giving that correct type of heat so necessary for the successful rearing of chickens.

In the first place, the electric lamps employed in these brooders are no more liable to break than the element fitted to the brooder described by your correspondent. Carbon filament lamps of a special design and manufacture are employed, and run well under their rated voltage. Consequently not only the right type of heat is produced but the lamps are durable.

Secondly, light is a decided attraction to chickens, not a deterrent, as your correspondent would appear to suggest. This statement is capable of obvious proof from the fact that oil brooders having a luminous flame have served, and in many cases still serve, the unfortunates who have no electricity, with every satisfaction. Chickens love light, and I am sure many an owner of a hover heated by non-luminous heat has come to this conclusion when he has found dead chickens round his brooder house windows on a bright, moonlight night. Needless to say, the moon would have no attraction to chickens housed in an " electric-lamp brooder."

I have personally conducted experiments with the two types of brooder. I have placed a luminous-heat brooder in a compartment already containing a non-luminous heat brooder under which chickens have been reared to two weeks old. The first night every single chick deserted its old home and took up residence in the newly inserted brooder.

Hundreds of farmers are using luminous radiant heat brooders with success hitherto unthought of. In my opinion the days of non-luminous heating elements are over, be they anthracite stoves, hot water pipes, or non-luminous electric brooders. The type of heat which they give off is by no means ideal. Finally regulation of a luminous radiant heat brooder is simplicity in itself. A turn of the switch produces a range of heat suitable for cooling off, at one end of the scale, or for the coldest of frosty nights at the other.

Preston, *July 14th*. A. A. S. ROSCOE.

The Lighting of the Mersey Tunnel

Our attention has been drawn to the article on the lighting of the new Mersey Tunnel, which appeared in your issue of July 8th (page 58). We think it necessary to state that we as a company were in no way responsible for the design of, or experiments in connection with, these fittings. The fittings were designed by Mr. P. J. Robinson, the electrical adviser to Sir Basil Mott, the consulting civil engineer to the Mersey Tunnel Committee, and our tenders were submitted to that Committee for consideration.

The contract was awarded to us, and the fittings were made by us at our Ponders End works strictly to the designs and specifications issued by the tunnel engineers. We ask you to publish this letter in view of the possible misinterpretation of the article as it appeared.

EDISON SWAN ELECTRIC CO., LTD.,
P. Kelly, *Managing Director*.

London, E.C.4, *July 15th*.

The Inventor of the Oil Engine

I have read with interest the letter by Mr. J. M. Shackleton appearing in your issue of to-day's date. Your correspondent states that in the "Diesel" engine air only is admitted during the suction stroke and, therefore, its compression can be carried much higher than is possible in engines in which the explosive mixture is compressed. This is true, of course, but the underlying principle was contained in the second claim of Akroyd Stuart's patent of 1890, No. 7146, which reads as follows:—

> "In an engine operated by the explosion of a mixture of combustible gas or vapour and air forming the said mixture by introducing the combustible gas or vapour into a charge of air under compression."

This claim was revolutionary and opened up a new field, for previously the combustible mixture had been compressed in the cylinder. Stuart actually built engines working on this principle although, for the time being, they were abandoned owing to manufacturing difficulties which have long since been solved. The present successful airless injection engine is a direct descendant of these early engines.

By gradual stages the compression pressure has been raised and the unjacketed surfaces dispensed with. Diesel, on the other hand, whilst injecting the fuel at the end of the compression stroke as proposed by Akroyd-Stuart, used air for injection and adopted a constant pressure cycle instead of the constant volume of explosive cycle adopted by Akroyd-Stuart.

I think that if the real significance of these facts were understood, full credit would be given to Akroyd-Stuart for the work he did, and the term "Diesel" would not be applied to an engine based upon principles definitely laid down several years before Diesel produced his first successful engine.

J. A. WALKER.

Lincoln, *July 15th*.

Earthing, or the Search for Sincerity

From the brilliant silence with which any letter on existing anomalies is favoured it would appear impossible to secure proper publicity. Meanwhile the reputable contractor is persecuted and slandered whilst the real culprits go scot free, as the following will instance:—

A supply authority demanded the removal of a wire from a water pipe lest the current should fuse the lead pipe and the water damage the adjacent property. The contractor's wireman during a conversation placed his hand on the authority's meter affixed to an insulated back board, and was promptly knocked out.

A consumer received shocks from a vacuum sweeper, although the house was fitted throughout with three-way sockets according to regulations, but the labour-saving device was sold with a two-way flexible and plug. It would not be etiquette to divulge the name of the supplier, I suppose?

Manchester, *July 11th*. L. E. WILSON.

Copper-clad Steel Conductors

With reference to Mr. Burnett's letter in your issue of July 5th, we have been using for a number of years the "J. & P." stirrup bind on copper-clad steel lines and have had no trouble. We agree that the binder should be as flexible as possible and at present are carrying out trials on a new pattern.

In reply to the last paragraph, a considerable number of tests on the relations between tensions and vibrations have been carried out by the manufacturers, who would doubtless be pleased to supply a summary of the results to Mr. Burnett.

Charlton, S.E.7, R. F. MARKHAM,
July 16th. C. ERIC STEWART.

Switch Safety

Why all this ado about Mr. Catford's test? It is perfectly simple *and reliable*, whether the lamps are in their holders or not. To be more simple, Mr. Catford might have said "Switch on the switch," but even if this is not done, most electricians instinctively try both terminals before being satisfied.

B. G. PALMER.

Colchester, *July 15th*.

The Dartford Industrial Development Exhibition

A HISTORICAL pageant is being held during this week in the grounds of the Countess of Limerick's residence, Hall Place, Bexley, in conjunction with which an Industrial Development Exhibition has been organised in which the various industries within the Dartford Parliamentary division of Kent are represented. Included in the area are such concerns as the Fraser & Chalmers Engineering Works, Callender's Cable & Construction Co., Ltd., and J. & E. Hall, Ltd., while the electricity undertakings of the urban districts of Bexley Heath, Erith and Dartford have a combined display, so that electricity is well represented.

Messrs. J. & E. Hall, Ltd., have photographs, models, &c., showing the growth of the company and its various products, which include refrigerators, lifts and escalators. Callender's have a large exhibit which covers their wide range of cables, accessories, feeder pillars, joint boxes, flexibles, the "Kalibond" and "Kaleeco" house-wiring systems, &c. The products of the Fraser & Chalmers Engineering Works include a selection from the wide range of plant manufactured at Erith, such as conveying and screening plant, and rolling mills. Most of the machines shown are in operation, being driven by electric motors, and the stand is suitably illuminated by G.E.C. industrial lighting fittings. The conveying plant includes two 16-ft. Fraser & Chalmers-Redler conveyors for powdered, granular, and small lumpy substances. Round two sides of the stand runs a Webb conveyor, a type that has only recently been introduced to this country for the circulation of raw material and work in production in factories.

The Dartford, Bexley Heath and Erith Urban District Councils and the West Kent Electric Co., Ltd., have entrusted the G.E.C. with the equipment of their stand, which covers all the apparatus needed for complete domestic electrification. The main sections of the stand are an electric kitchen at one end, an electric laundry at the other, and an electric bathroom in the middle. The intervening spaces are occupied by small displays, each showing one particular class of apparatus such as hairdryers, bed-warmers, floor polishers, toasters, cookers, synchronous electric clocks, &c.

Conveying equipment displayed on the Fraser & Chalmers Engineering Works stand at the Dartford Industrial Exhibition and (right) the combined stand of the district electricity supply authorities

New Apparatus and Devices

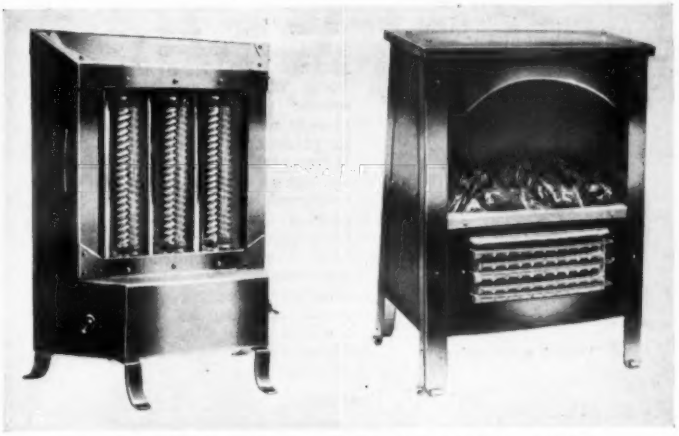
for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

New Fires and a Toaster

Further developments have recently taken place in the "Eddo" range of domestic appliances manufactured by MESSRS. H. G. MOSELEY & CO., LTD., Eddo Works, Hospital Street, Birmingham. The new 1-kW "Cosy" fire priced at 44s. (2-kW model, 54s.) and the 2-kW "Eddoglo" fire at 60s. are both new imitation coal fires. There is also the 2½-kW "Radiant" radiator priced at 50s. and designed to spread the heat over a wide area: on this model there are three heats with loadings of ¾ kW, 1½ kW, or 2¼ kW. Another newcomer is the "Reliance" radiator, a portable model which is available with a loading of 2 kW (two heat) at 39s. 6d. or 3 kW (three heat) at 49s. 6d.

A new 450-W iron, selling at 10s. 6d., a lower price than the No. 2 model, has been introduced. It weighs 5½ lb. and spare elements are available at 3s. 9d. each. A five-year guarantee is given with this model as with the No. 2 model.

The company has now turned its attention to a fresh line in the domestic field and is manufacturing a toaster at 18s. 6d. It is a 600-W model and embodies an automatic bread-turning arrangement. All these appliances are illustrated here.



The "Radiant" radiator and the 1-kW "Cosy" coal fire

A 3-ton Electric Vehicle

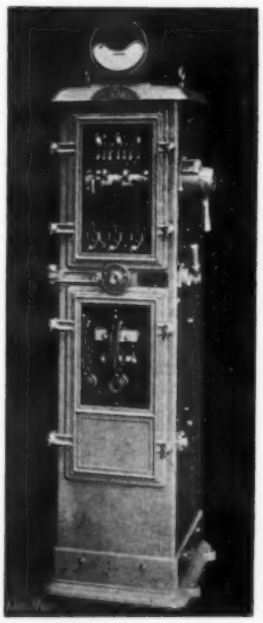
A new short wheel-base low-loading electric truck chassis has just been introduced by the GENERAL VEHICLE CO., LTD., Pakenham Street, King's Cross Road, W.C.1. Whilst the vehicle is classed as a 3-tonner, it is designed to carry a gross load of 4½ tons, so that an allowance of not less than 30 cwt. is made for bodywork.

The chassis, illustrated below, is equipped with small steel-disc wheels, the front pair carrying single and the rear ones dual 26-in. by 5-in. solid tyres. Efforts have been made to obtain a useful mileage per battery charge. Assuming a 260-Ah battery, a distance of 35-40 miles should be possible over hard and level roads, and carrying a gross load for half the distance. With a 290-Ah battery the estimated distance is 40-45 miles, and with a 320-Ah battery 45-50 miles. The speed unladen is about 11½ m.p.h., while even with full load it is not reduced to much less than 10 m.p.h. A single totally enclosed motor is employed, having a hand-operated controller which gives five forward and two reverse speeds. The power is transmitted to the rear wheels by worm-type final drive. Hand and foot operation of the rear wheel brakes is provided, the drums being of large diameter. The weight of the chassis without battery is 39 cwt., the overall length being 17 ft. 8 in. and the width 6 ft. 6 in. The width of the wheelbase is 8 ft. 1 in., the front and rear tracks of the vehicle being respectively 5 ft. 3 in. and 5 ft. wide.

The G.V. 3-ton truck

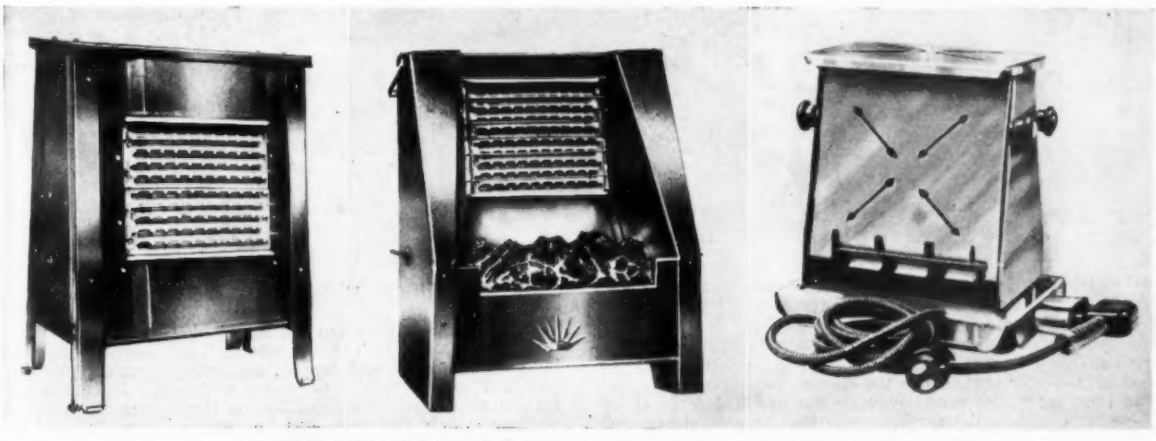
New A.C. Motor Control Gear

The new range of "contactor-break" a.c. motor control gear developed by BROOKHIRST SWITCHGEAR, LTD., Chester, represents a logical attempt to meet present-day conditions in a commercially practicable way, by the provision of a t.p. main contactor capable of rupturing all normal overload currents, allowing almost unlimited "inching," yet securing visible operation and free access to the interior. There are also thermal type overload trips with independent heating coils which while permitting full advantage to be taken of the legitimate overload capacity of the motor, afford true "temperature-rise" protection of the motor windings, resulting in an almost constant ratio between motor temperature and tripping temperature.



An example of the new "contactor-break" gear

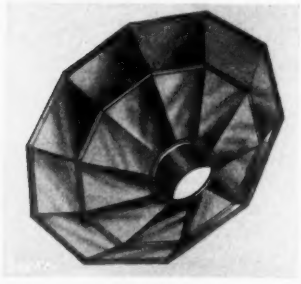
High rupturing capacity cartridge fuses are arranged to open circuit independently of the starter, thereby relieving the starter and its normal overload tripping features from dangerously high short-circuit currents and compromised settings. This second line of defence in the shape of fault protection fuses does not mean frequent replacements, but to facilitate matters three spare cartridge fuses are neatly fitted inside the inspection doors of the starter. Tests have shown these quite small cartridge fuses of the filled type to have a rupturing capacity of 25,000 kVA at 440 V. All switchgear upon a public supply is subject to an ever-increasing short-circuit value, and the development of large interlinked power stations has very seriously in-



A 2-kW "Reliance" radiator, the "Eddoglo" fire, and the "Toastit"

creased the severity of these conditions. The short-circuit conditions generally therefore are out of proportion to the rating of the motor controlled. A unit typical of the new range is illustrated; it is a startor-rotor control panel suitable for a slipring motor.

A " Light Economiser "



A " light economiser "

MESSRS. MCLEOD & MCLEOD, 329, High Holborn, W.C.1, have put a mirror reflector on the market which can be used in place of a lampshade. It is particularly suitable for use in offices where a restricted beam is needed over a desk, as the reflector gives a very intense light over a small area, with the result that where the light is only required locally a lamp of small wattage may be used. These reflectors are priced at from 2s. 6d. to 5s.

New B.I. Products

A new type of cable, for use in connection with " wireless on tap," has recently been introduced by BRITISH INSULATED CABLES, LTD., Prescot. This cable is made up in pairs, each conductor is enamelled, cotton covered and paraffin waxed, and each pair is separately screened with a metallised paper tape. The whole is then covered with a lead-antimony alloy sheath.

Another new B.I. product is copper strip extruded in a serrated or corrugated form for use in packing the joints of steam cylinders.

New Steel Conduit Fittings

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, announces that they are bringing out a comprehensive range of pressed steel lug-grip conduit fittings for use with unscrewed light-gauge conduit. The pressed steel junction boxes are claimed to be as serviceable as cast boxes, but are lighter: they are made with knock-out holes.

A New Vacuum Cleaner

The " Duco " vacuum cleaner, manufactured by BROWN BROS., LTD., Great Eastern Street, E.C.2, sells at £4 19s. 6d. On 230 V the loading is 145 W, and the vacuum with a ¼-in. orifice is 12-in. water gauge. On 240 V the loading is 155 W and the vacuum 12¾ in. The machine is of the non-sweeper type and is fitted with a universal (a.c. or d.c.) motor, a rubber-ribbed hose, and 18 ft. of flexible. The nozzles and brushes are fitted with rubber furniture guards; the ends are plated, and the cleaner itself is covered with leatherette. In addition to the attachments shown in the illustration an upholstery crevice tool is provided.

The " Duco " cleaner and attachments

A Push-button Motor Starter

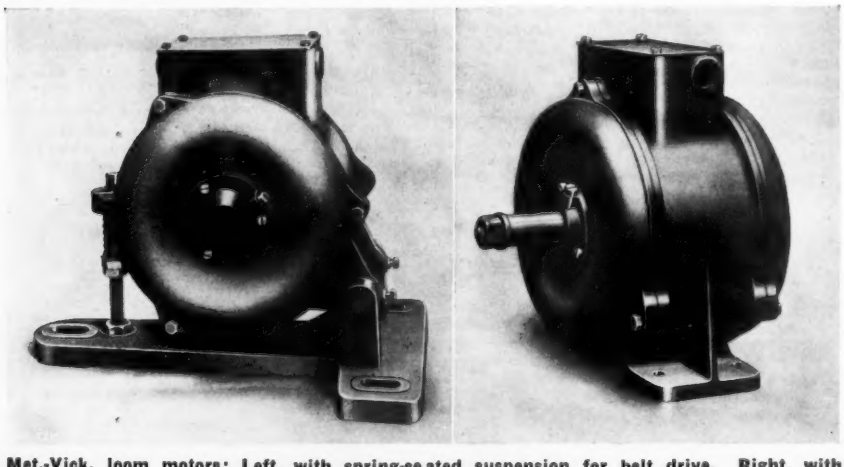
A new design of starter for electric motors bearing the trade name " Auto-Memota " has just been introduced by the MIDLAND ELECTRIC MANUFACTURING CO., LTD., M.E.M. Works, Barford Street, Birmingham. The starter is suitable for squirrel-cage and certain other types of induction motors from ½ to 5 h.p. It has silver surfaced contacts which are easily replaceable and a load indicator is incorporated with instructions for setting. The trips are designed to operate at a minimum overload of 20-30 per cent. above the current setting on the scale. The time lag varies inversely with the overload from about 15 seconds with a 100 per cent. overload to several minutes with a 25 per cent. overload.

The " Auto-Memota " push-button starter

The push-button control is arranged in a separate unit which may be fixed to either the top or the bottom of the starter or in distant position from the starter which is enclosed in a weatherproof cast-iron case drilled with three clearance holes top and bottom for ¾-in. conduit each fitted with a steel knock-out. The weight is 14½ lb., the price 50s., and the overall size approximately 11½ in. by 9 in. by 5 in.

Loom Motors

The line of loom motors made by METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, has been extended by the development of three new frames which have been applied to the existing 1- and 1½-h.p. motors. Loom motors are now supplied in five sizes of uniform design, running at 960 r.p.m. (for 50 cycles) as follows: L.3211, ½ h.p.; L.3610, ¾ h.p.; L.3612, 1 h.p.; L.4111, 1¼ h.p.; and L.4113, 1½ h.p. They can also be supplied to run at 720 r.p.m. with correspondingly reduced outputs.



Met.-Vick. loom motors: Left, with spring-seated suspension for belt drive. Right, with plain shaft extension

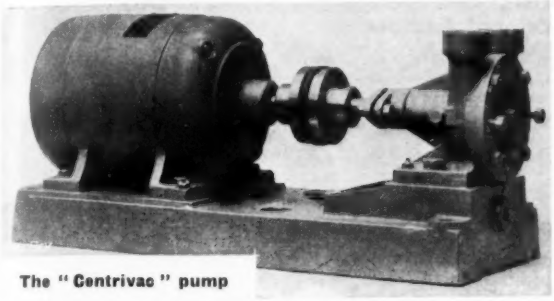
The high-carbon steel shafts now have diameters of 1¼ in. (instead of ⅞ in.) in the bearings, and 1⅜ in. in the shaft extensions. For the larger shafts correspondingly larger ball bearings are fitted; these are packed with grease before despatch, and require attention only about once in six months.

The rotor windings, which formerly comprised copper bars threaded through the punchings and electrically welded to heavy copper end rings, now consist of aluminium bars and end rings cast in one piece by a patented process which gives a homogeneous winding free from joints and blow-holes.

Cast terminal boxes are now standard, and are sent out with both bosses drilled and tapped, and conduit with a plug for insertion in the hole that is not required. An important feature of the cast terminal box is the ease with which a starting switch and fuses can be mounted directly upon it, thus reducing the installation cost.

A New Rotary Pump

The new "Centrivac" pump consists of a rotor set eccentrically in the casing and having two vanes, each carried in slots diametrically across the rotor. The two vanes are fixed on a centre block which rotates on a hardened steel pin fixed concentrically in the cover. The vanes rotate concentrically within the casing and are held by the centre pin definitely clear of the casing, thus maintaining a clearance between their tips and the casing and eliminating wear at this point. The rotor is also carried definitely clear of the casing. The pump requires no lubrication, being arranged internally with a by-pass service to the bearing, and will run for continuous periods without attention or overheating. Renewal of the centre block and vanes is both cheap and simple.



The "Centrivac" pump

The pump costs from £6 5s. to £15 according to size, and is obtainable from THE PULSOMETER ENGINEERING CO., LTD., 39, Victoria Street, S.W.1.

A New Iron

A number of new irons have been marketed recently, and the ALLIANCE WHOLESALE, LTD., 62, Great Russell Street, W.C.1, is adding yet another, in which it has embodied a number of interesting features. This "Russell" iron has a nickel-plated "mirror" finish, and a moulded thumb rest. Another feature is the chamfered toe with a smooth inclined surface; three yards of flex is included, which should be ample for most situations.

The iron is guaranteed indefinitely against faulty workmanship and material, and is listed at 15s. The element is mica insulated, and has a loading of 400 W; the weight of the iron is 5 lb.

The new "Russell" iron dismantled

News by Television

IN the first public notification of the lines on which its television research is proceeding, Marconi's Wireless Telegraph Co., Ltd., indicates as one of its objects a departure from the stereotyped head and shoulders picture, and stresses the fact, which has to a certain extent been overlooked, that television has a future outside as well as inside the amusement field; also that some applications may not necessarily involve the use of wide frequency bands, such as are deemed necessary for good picture television, and for these applications ordinary commercial wavelengths can be employed for radio transmission.

For certain classes of work a medium long wave of 1,000 metres provides sufficient band width, free from interference, an example of which is apparatus which has been developed for the commercial transmission of news. It is designed to transmit images of a moving tape on which characters are printed by a special typewriter. The light source is a 1,000-W gas-filled metal-filament projector lamp mounted vertically with a reflector behind it. The light passes through a spherical condenser lens system on to a reflecting mirror and an aperture, and thence through a system of lenses mounted in a spiral on a lens drum. There are fifteen such lenses on the drum and the picture repetition frequency corresponding to the speed of the drum is twenty per second. A sharp image of the aperture is projected by each lens on the tape and is swept over it by the motion of the lens drum. The tape is carried vertically between two rollers, the bottom one of which is driven through suitable gearing by the same motor that drives the lens drum, and the tape can be given a speed of either 60 or 120 w.p.m.

Behind the tape is mounted the photo cell and its amplifier, both of which are contained in a single shielded unit. The lens drum driving motor is maintained at constant speed by means of a synchronous motor controlled by a tuning fork mounted in the bottom of the frame under the lamp-house. Above the tuning fork is the fork amplifier unit, and above that is the control unit for the whole system. The frame which supports the lens wheel and tape drive carries two panels, the lower one being the line amplifier and the other the synchronising circuit which sends out a special signal with the picture signal for the purpose of keeing the receiver scanning motor in step.

In this type of transmitter, the frequency band necessary depends on the number of letters shown at the same time in the picture, and a convenient method of adapting the television to any width of band available is therefore to alter the length of the picture, which alters the number of letters shown accordingly. Thus, the frequency band required by the apparatus described is 13 kc., but by reducing the distance between the lenses on the drum, which shortens the picture length and reduces the number of letters shown, this band width can be reduced to any convenient value.

The receiver shows a long narrow picture having a size dependent on the power of the modulated light source, and with existing facilities pictures can be obtained from a few inches in length up to several feet.

The Marconi news television equipment

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

A New Lamp Factory

The formal opening of a new factory by Aurora Lamps, Ltd,. at Old Kilpatrick, near Glasgow, on Wednesday (July 13) introduces electric lamp making to Scotland. It is an attempt to replace the lamps formerly imported from abroad by lamps of Scottish manufacture and not to secure the trade of English manufacturers. The manufacturing capacity of the Aurora company is claimed to be capable of extension sufficient to meet the whole requirements of Scotland. The plant at present installed has a potential output of 750,000 lamps per annum. Owing to the demand the company has placed orders for further machinery which will be installed within the next few weeks; so that in a short time it will be in a position to supply 1,500,000 lamps annually. At the opening ceremony Mr. J. B. McGillivray, chairman of the company, presided, and the factory was declared open by the Lord Provost of Glasgow, Sir Thomas Kelly. Sir James Lithgow, Bt., chairman of the Scottish National Development Council, also spoke.

Some " Ediswan " Lighting Installations

Among recent lighting installations designed by the Edison Swan Electric Co., Ltd., and carried out with equipment supplied by the company are the following :—At the new bus depôt of the Cardiff Corporation where the lighting was specially arranged in conjunction with the officials of the depôt to facilitate the cleaning of the vehicles at night; the illumination of the shop windows of Messrs. T. W. Carryer & Co., Ltd., Newcastle-under-Lyme; showcase lighting at the premises of the Silverdale Co-operative Society, Ltd., Silverdale, Newcastle, Staffs (contractors Messrs. J. Bagguley & Son), employing " Scoopette X-Ray " reflectors with a Florentine bronze finish, and a shop window installation for the same society (shown above); and an extensive concealed system of lighting in St. Paul's Church, Clifton. The last installation includes a large number of " Mirolux " troughs in the nave and aisles and special " Floodray " projectors for illuminating the reredos. Each of the trough fittings has two lamps wired in separate circuits, enabling an even half-light to be obtained. Another industrial installation recently carried out with " Ediswan " fittings is at the works of Boxfoldia, Ltd. (box makers).

An " Ediswan " lighting installation in the windows of the Silverdale Co-operative Society

The Shipping, Engineering, and Machinery Exhibition

A luncheon was held at the Connaught Rooms last Friday in connection with the Shipping, Engineering and Machinery Exhibition to be held at Olympia during September next year. After the report by the general manager, Mr. F. W. Bridges, Dr. Hele-Shaw, who has been elected chairman of the Honorary Committee of Experts, proposed a vote of thanks to Lord Wester Wemyss for his co-operation in 1931, and for his acceptance of the presidency for the next exhibition. Mr. D. A. Bremner, director of the British Engineers' Association, was elected to the position of vice-chairman of the Honorary Committee of Experts.

Birkenhead and Wiring Contracts

The Birkenhead Town Council has confirmed the Electricity Committee's proposals for the closing down of the electric wiring department; the putting out to private tender of all wiring contracts and repair work (except in emergencies); and the absorption in the employ of the successful contractor, or contractors, of the apprentices at present in the Electricity Department, except those retained by the Corporation. The chairman of the Electricity Committee said that the department was of the opinion that it could do the work more efficiently and cheaper than any outsiders. It had three years' experience, and up to the present 33,818 lighting points had been fixed in various houses, in addition to 5,607 plug points, making a total of 39,425 points. In addition, 179 double switches had been installed. This had been done at a cost of £32,599, in addition to £10,078 for looping. With the exception of one charge of £1,924 for looping, no overhead charges had been made. The borough treasurer considered that an allowance of 15 per cent. for overhead charges was on a low basis. Fifteen per cent. added to the original charge was £6,417—making a total of £49,201. This £6,417 was an invisible loss on the scheme.

G.E.C. Radio Propaganda

The General Electric Co., Ltd., is preparing a scheme for increasing its sales of radio apparatus. The advertising campaign embraces prominent spaces in the National and provincial Press, as well as the wireless Press and home magazines. An informative broadside is to be issued to the trade, a series of attractive publications, some available for overprinting, and the home constructor's chart prepared in connection with the new Osram Thirty Three Music Magnet Kit. The arrangements in hand by the G.E.C. in connection with the National Radio Exhibition are on the customary enterprising lines.

Electric Cookers in New Zealand

By a recent New Zealand mail we learn that the Christchurch Municipal Council is considering a proposal that the Electricity Department be instructed to terminate as early as possible the further importation of electric ranges and in future to handle exclusively ranges of New Zealand manufacture. On the other hand it is announced that the Waitemata Power Board, which has decided to commence trading in electrical appliances with the object of popularising domestic electrical service, is making an endeavour to secure the abolition of the import duty with a view to reducing the price to customers. At present imported electric heating appliances are subject to a duty of 20 per cent.

A Giant Neon Sign for Scotland

One of the largest animated neon signs in the United Kingdom has recently been erected on the Clyde Bridge (L.M.S.), Glasgow, by Franco Signs (Franco-British Electrical Co., Ltd.). This huge installation, measuring 140 ft. by 20 ft. overall, provides a fine example of combined neon, box signs and floodlighting, and in its construction some thirty transformers have been used and a total of 1,400 feet of tubing. The heavy locomotive traffic regularly using this bridge and the consequent vibration introduced a number of factors which demanded special attention and extensive experiments were instituted by Franco engineers before the final details were decided upon.

Company Registrations

According to a list compiled by Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C.2, 5,093 companies with a total nominal capital of over £34,000,000 were formed during the first half of the current year. Among these were 264 companies under the heading " Electricity, gas, and water," their aggregate capital being £587,100.

Department of Overseas Trade Publications

Among the reports recently published by the Department of Overseas Trade are the following: " The Economic Situation of Finland in April, 1932, and Foreign Trade for the First Quarter of 1932 "; this shows that in the period mentioned Finland imported 266 metric tons of electrical machinery (against 204 tons in January-March, 1931), and 85 tons of electric cables (against 187 tons).

" The Economic and Commercial Conditions in Algeria, 1931 "; 2,400 metric tons of electric wire and cable was imported in 1931, as compared with 2,540 tons in 1930.

" Economic Conditions in Bulgaria " (Stationery Office, 2s. 6d. net), in which the British Consul at Sofia states that in 1930 there was a slowing-up of electric power development; in that year the generating capacity of Bulgarian power stations totalled 73,841 kVA, while 10,170 kVA of hydro-electric,

and 3,750 kVA of steam plant was under construction. Extensions of electricity supply in the capital are expected to follow the completion of two new hydro-electric stations.

New Municipal Showrooms

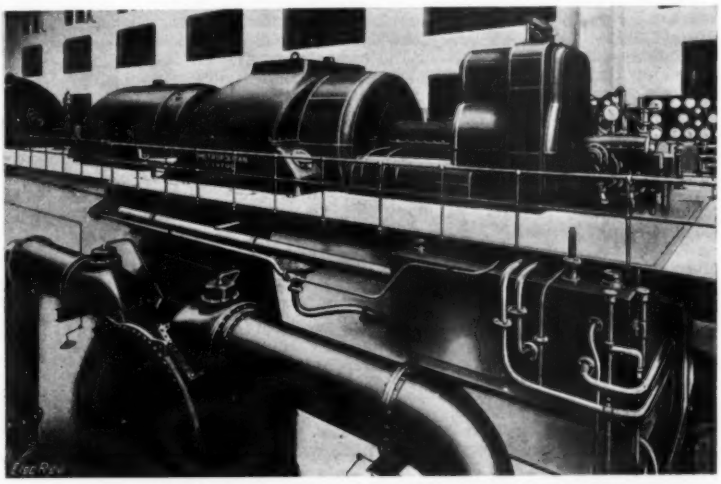
It is intended to provide premises in Wallasey as an electricity showroom, and a deputation has been appointed by the Town Council to visit a number of towns to gain information regarding the best designs.

The Middleton (Lancs) Town Council has referred back to the Electricity Committee a proposal to erect new showrooms, offices, stores, and a sub-station in the centre of the town, at an estimated cost of £5,350. The objection is that the proposed site is not suitable for the purpose.

Met.-Vick. Plant in Japan

The British Association of Japan's Quarterly Letter to members (April-June, 1932), says that an indication that the Japanese engineers are fully alive to the necessity for installing the most up-to-date plant and that they realise that the home of steam engineering, as that of the steam engine, is in England, is evinced by the fact that during the last eighteen months the Metropolitan-Vickers Electrical Co., Ltd., has completed installations of steam generating plants amounting to no less than 160,000 kW. The world tendency to operate at the higher limits of the steam cycle within the limits of the development of materials is apparent in the case of this plant.

Among the Japanese concerns which have ordered large machines from the company are the Kobe Municipality, the Nippon Denryoku, the Kyushu Denki Kido, the Nankai Tetsudo, and the Sanyo Chuo. Our illustration shows a 40,000-kW, two-cylinder set at the Amagasaki station of the Nippon Denryoku.



A 40,000-kW Met.-Vick generating set at Amagasaki, Japan

Recent Contracts

Messrs. H. Tollemache & Co., Ltd., Canada House, Norfolk Street, W.C.2, have received a contract from British Insulated Cables, Ltd., for pulverised coal plant in connection with the new copper refinery now in course of construction at Prescot, Lancs.

The British Thomson-Houston Co., Ltd., has received an order from H.M. Office of Works for a part supply of gas-filled lamps.

The Leyton Borough Council has recently placed with Britannia Batteries, Ltd., a repeat order for one 60-cell A.1.10 nickel-iron 375-Ah battery to be used in a 3½-ton refuse collection vehicle. This is the ninth Britannia alkaline battery that this Council has fitted to its electric refuse vehicles.

Among the more important orders for "Osram" lamps recently received by the General Electric Co., Ltd., are contracts from the Belfast Corporation Electricity Department, the Royal Mail Steam Packet Co., Ltd., H.M. Office of Works, the Clyde Navigation Trust, and the Prestwich U.D.C.

Electrical Tableaux in a Carnival

The accompanying illustration shows one of three decorated electric vehicles entered in a recent hospital carnival procession by the Willesden Electricity Department (engineer: Mr. A. W. Blake). It depicted the ease of electrical kitchen work, and opposed to it was another vehicle illustrating the pre-electric kitchen. The third vehicle advertised the hospital's needs.

A Willesden carnival tableau

New Zealand Electrical Imports

The *Board of Trade Journal* states that the imports of electrical apparatus into New Zealand during the first quarter of the current year were valued at £154,676. Of this total the United Kingdom's share was £115,837, that of the United States £15,752, Australia's £9,276, and Canada's £5,367. The value of telephone and wireless apparatus imported was £44,914, of which the United States supplied a total of £26,456, the United Kingdom £7,964, Australia £7,334, and Canada, £1,156.

French Electrical Imports and Exports

The official returns lately issued show that during the three months ended with March last the imports of electrical machinery, apparatus and cognate material into France attained a value of 130,828,000 fr., as compared with 174,713,000 fr. in the corresponding quarter of 1931. During the same period there was an even greater falling off in the exports of similar material from France—from 124,134,000 fr. to 69,492,000 fr.

Trade with Spain

The British Chamber of Commerce of Spain has issued an appeal to those who are concerned with Anglo-Spanish trade in which it points out the imperative necessity for them to support the Chamber's work. It is stated that "during the next twelve months we may expect to see important changes in the conditions now governing trade between Spain and the United Kingdom, calling for strenuous work on the part of this Chamber and justifying its existence more than ever." These changes, it would appear, will be due to the altered position of the United Kingdom in the matter of tariff bargaining since the advent of the present Government.

Italian Foreign Electrical Trade

The imports of electrical machinery, apparatus, and cognate goods into Italy during the three months ended March were valued at £518,725, as compared with £884,575 in the corresponding period of last year. On the other hand, the exports of similar material from Italy during the same period increased from £288,085 to £418,825.

German Electrical Imports and Exports

The official returns just to hand show that the imports of electrical machinery and apparatus into Germany during the four months ending with April last attained a value of £431,150 as compared with £638,750 in the corresponding four months of 1931. The exports of similar material from Germany during the four months amounted to £6,011,000 against £8,092,050 for the corresponding period of last year.

Egyptian Electrical Imports

The value of imports of electrical machinery, apparatus, fittings, and parts into Egypt during 1931 totalled £E879,202 as compared with £E524,058 in 1930.

Czecho-Slovakian Electrical Imports

During May the value of imports of electrical machinery and apparatus into Czecho-Slovakia was 18,312,000 crowns, making the total for the first five months of the current year 91,495,000 crowns.

Gambian Customs Tariff

The Customs Tariff Ordinance, which is effective as from June 13th last, introduces a preference on Empire goods imported into Gambia. The new schedule includes electrical goods and apparatus, the British preferential tariff on which is 10 per cent. *ad valorem*, and the general tariff 12 per cent. *ad valorem*. The general tariff on electric lighting and power machinery for industrial purposes is 12½ per cent. *ad valorem*.

The Norwegian Radio Market

A recent Department of Overseas Trade report on this subject shows that in 1930 Norway imported radio receiving sets and parts (including loudspeakers) to the value of 4,312,800 kr.; the bulk of these came equally from Germany and Holland, while the United Kingdom's share was only 142,700 kr. The American type of set is popular. All mains-operated sets have to receive official test and approval by the Norske Elektrisitetsverkers Forening, Kronprinsensgaten, 19, Oslo. Copies of the report (A. 11402) may be obtained from the D.O.T., 35, Old Queen Street, S.W.1, by United Kingdom firms interested in this trade.

Electrostatic Precipitation

The extending use of pulverised fuel gives added importance to the development of means of dealing with the problem of grit and dust from boiler installations. Messrs. Lodge-Cottrell, Ltd., who specialise in electrostatic methods of precipitating dust, inform us that the interchange of experience with other leading concerns in Germany and the United States recently led up to a definite agreement between them under which all patents, drawings, and technical and commercial experience have been pooled for the common benefit of the group. This is leading to a speeding up of development and an improvement and cheapening of apparatus.

The Mexican Radio Market

According to a Department of Overseas Trade report on the market for radio apparatus in Mexico, the proximity of the United States has given American manufacturers a decided advantage and there is practically no competition, the importation of United Kingdom, French and German equipment being comparatively small. The principal demand is for radio-gramophones, but the demand for the small size set is increasing rapidly.

French Import Restrictions

Quotas have been fixed for the imports of certain goods into France during the period July 1st to September 30th. These include electrical material of porcelain, faience, white or coloured stone, china, glass, crystal, &c., for which the quota is 352 quintals; the same, with metal parts or fittings, 418 quintals (United Kingdom share 23 quintals); insulators of steatite, &c., with or without metal parts and fittings, 45 quintals; wireless valves, 462 quintals (United Kingdom share 108 quintals); and apparatus for wireless telegraphy and telephony, 3,866 quintals (United Kingdom share 140 quintals).

A Veteran " Electric "

The antique conveyance shown in the accompanying illustration was made by Messrs. Krieger, Paris, and brought to this country in 1907; it is still in service. The vehicle is propelled by two motors, one on each front wheel, with a total

A long-lived electric vehicle

rating of 6 h.p., supplied from a 168-Ah " Kathanode " battery (D.P. Battery Co., Ltd.). The present battery has been in use for a year, and is still going strong; its predecessor drove the car 28,000 miles in about five and a half years. The vehicle is capable of a maximum speed of 35 m.p.h., but its average is between 15 and 20 m.p.h. It was purchased in 1912 by Mr. J. Scott, of Victoria Street, S.W.1, and is still usefully employed.

The " Langapres "

This useful office requisite is a hand-operated printing machine for small work, specially adapted for overprinting agents' names, slogans, notices, &c., on catalogues, leaflets, labels, envelopes, and general stationery. A speed of 600 copies per hour can be maintained without fatigue. The net weight of the machine, which is made by Lang Clayden, Ltd., Bush House, Aldwych, W.C., is 12 lb. Its users include many electrical concerns.

Suggestion Schemes

The Industrial Welfare Society, 51, Palace Street, S.W.1, has prepared a memorandum on work suggestion schemes in which the operation of a number of schemes is analysed, and an attempt is made to afford practical guidance to managements contemplating the introduction of the system into their works.

Trade Announcements

The telephone numbers of the Yorkshire Copper Works, Ltd., have been altered to Leeds 75431-6.

Messrs. J. and M. Stone, radio and electrical goods dealers, of 96, Peckham Road, London, S.E., have opened branch premises in Smithford Street and the City Arcade at Coventry, and are shortly opening a similar business at Leicester.

Mr. W. H. Stone, who has acted for some years as provincial sales manager for the Tungsram Electric Lamp Works (Great Britain), Ltd., is commencing business as a wholesale electrical distributor and factor at Cardiff; his present address is 16/17, Hill's Terrace, Cardiff. He asks for manufacturers' lists and prices.

Messrs. Bayricks Stores, 2, Hamstead Road, Handsworth, Birmingham, ask for electrical instrument and lamp (E.L.M.A.) window displays.

Mr. A. W. A. Dick-Cleland, B.Sc., late of the Engineering Design Department of the General Electric Co., Ltd., has joined with Mr. Walter Bennett of Glasgow, and under the style of Dick-Cleland, Bennett & Co., Ltd., they have commenced business as electrical engineers at 21, Douglas Street, Glasgow, C.2. Their chief work will be electrical contracting and electrical machinery repair. They will be glad to receive catalogues, etc.

Annual Holidays

The Slough establishment of the Rheostatic Co., Ltd., will be closed from July 30th to August 7th inclusive.

The works of Messrs. James Booth & Co. (1915), Ltd., Argyle Street, Nechells, Birmingham, will be closed from July 30th to August 7th inclusive.

Messrs. Brook Motors, Ltd., announce that their works and offices will be closed from August 6th to 14th inclusive.

The works of the English Electric Co., Ltd., are to be closed during the following periods:—Bradford, from July 23rd to August 1st; Stafford and Rugby, from July 30th to August 7th; and Preston, from August 6th to 15th—all dates inclusive.

For Sale

Grimsby Corporation Electricity Department has for sale twenty-eight transformers and eight e.h.p. oil switches.

Rawtenstall Corporation Electricity Department has for disposal steam generating sets, converting plant, transformers, meters and motors.

The South Somerset and District Electricity Co., Ltd., has for sale a rotary convertor, a motor-alternator, l.p. control panels, &c.

Bridlington Electricity Department have wireless eliminators for disposal.

Messrs. Steans, Ltd., will sell by auction on July 26th at Featherstone Farm, Mill Hill, the plant, fittings, &c., belonging to a firm of electric lighting and sign contractors.

(See our advertisement pages to-day.)

Advertisement Correction

By a printer's error the rental of premises advertised by Messrs. E. W. Beard & Sons in our last issue (Supplement, p. 20) was given as £80 per annum, whereas the correct figure is £800.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, Etc.	Price July 20th	Fortnight's Inc. or Dec.
a	Acid, Oxalic ... ... per cwt.	50s.	—
a	Ammoniac, Sal ... ... per ton	£40	—
a	Ammonia, Muriate (large crystal) ... ,,	£38	—
a	Borax ... ... ,,	£17	—
a	Copper Sulphate ... ... ,,	£17	—
a	Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a	,, Perchlorate ... ... ,,	5½d.	—
a	Shellac T.N. ... ... per cwt.	£3 15s.	—
a	Sulphur Commercial ... ... per ton	£11	—
a	,, Roll ... ... ,,	£11	—
a	Soda, Chlorate... ... ... per lb.	3½d. to 3¾d.	—
a	,, Crystals... ... ... per ton	£5 to £5 5s.	—
a	Sodium Bichromate, casks ... ... per lb.	4d.	—
	METALS, Etc		
b	Aluminium, Ingots ... ... per ton	£95 to £100	—
b	,, Wire ... ... per lb.	1/1 to 1/9	—
b	,, Sheet and Foil ... ... ,,	1/1½ to 2/9	—
p	Babbits Metal and Anti-friction Metals—		
	Grade I ... ... per ton net	£120	£1 inc.
	Grade II ... ... ,,	£85	£1 inc.
	Grade III ... ... ,,	£48	—
c	Brass (rolled metal 2" to 12" basis)... per lb.	6¼d.	—
c	,, Tubes (solid drawn) ... ... ,,	8½d. to 9d.	—
c	,, Wire, basis ... ... ,,	7¼d.	—
c	Copper Tubes (solid drawn) ... ... ,,	9½d.	—
g	,, Bars best selected) ... ... per ton	£59	—
g	,, Sheet ... ... ,,	£59	—
g	,, Rod ... ... ,,	£59	—
g	,, (Electrolytic) Bars ... ... ,,	£36 5s.	—
d	,, ,, Sheets... ... ... ,,	£64	—
d	,, ,, Wire Rods ... ,,	£36	£4 5s. dec.
d	,, ,, H.C. Wire ... per lb.	5½d.	½d. dec.
	Ebonite Rod ... ... ,,	1/3 to 1/6	—
	,, Sheet ... ... ,,	1/3 to 1/6	—
m	German Silver Wire ... ... ,,	2/2	—
h	Gutta-percha, fine ... ... ,,	nom.	—
h	India-rubber, Para fine ... ... ,,	3½d.	½d. inc.
i	Iron, Pig (Cleveland No. 3) ... ... per ton	58/6	—
i	,, Wire, galve. No. 1, P.O. qual. ,,	£20	—
g	Lead, English pig ... ... ,,	£11 5s.	£1 dec.
g	Mercury ... ... per bot.	£10 15s. to £11 5s.	£1 dec.
e	Mica in original cases) small ... per lb.	6d. to 8/6	—
e	,, ,, medium ... ,,	4/- to 8/-	—
e	,, ,, large ... ,,	8/6 to 17/6 & up	—
p	Phosphor Bronze, plain castings ... ,,	1/1d.	—
p	,, ,, drawn bars & rods ,,	10½d.	—
p	,, ,, rolled strip & sheet ,,	10½d.	—
p	,, ,, wire ... ... ,,	11½d.	½d. dec.
o	Platinum ... ... per oz.	£9 15s.	—
d	Silicium Bronze Wire... ... ... per lb.	7½d.	—
r	Steel, magnet, in bars ... ... ,,	7½d.	—
g	Tin, Block (English) ... ... per ton	£127 15s. to £129 15s.	£2 5s. inc.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/1	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Boiling & Lowe.
l Richard Johnson & Nephew, Ltd.
m P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Social Events

Henley's Sports Club, Gravesend, held a sports gala and children's treat on July 9th at the Club grounds at Cragg's Farm, Singlewell, in ideal weather. Over 500 children attended the children's treat, including a number of orphan guests. Each child was given 6d. on entering the field and provided with tea. In addition, the children from the orphanage were presented with a bag of sweets, and a special relay race was arranged for them. Other races were organised for the

Father and sons at Henley's sports

children, and swings and roundabouts were provided. Among the visitors were Sir George Sutton, Bt., Sir Montague Hughman and Lady Hughman, Miss Goodchild, Mr., Mrs. and Miss Bishop, Mr. and Mrs. Wright, Mr. and Mrs. Lefeaux, Mr. and Mrs. Judge, Mr. J. W. Lock, Mr. and Mrs. Barry and Mr. and Mrs. Seel. In spite of the heat a large and varied programme was carried through, the first event commencing at 2.30 p.m. and the last at 5.50 p.m. A cup was presented by the works management for the competitor obtaining the most points, and this was won by J. C. Wilkings. Mrs. W. F. Bishop presented the prizes at the close.

The annual staff outing of Messrs. John Shaw & Sons, Wolverhampton, Ltd., took place on July 9th, the party travelling by rail to Rhyl. Luncheon was served at the Queen's Hotel, Mr. V. A. Mattick, director and general manager, presiding. Speeches were brief, and after the lunch everyone was left to follow his own inclinations. The return journey was made at 9.30 p.m.

The annual carnival and sports organised by the British Thomson-Houston Co., Ltd., on behalf of the Hospital of St. Cross were held on July 16th at Rugby. The carnival procession included the "Mazda Kilties," a regiment of girls from the Mazda lamp factory. The sports meeting was held on the company's recreation club ground and attracted entries from all over the country, the results of the various events being announced by means of a B.T.-H. sound-amplifying van. The prizes were distributed by Lady Fielding. (See picture on page 139.)

The annual sports of the Newcastle-upon-Tyne Electric Supply Co., Ltd., were held at Wallsend on July 9th. All the departments in Durham, Northumberland, and Yorkshire took part in the programme.

Price Reductions

The British Thomson-Houston Co., Ltd., announces substantial reductions in the prices of its "Synchro-Blue," "Golden-Disc," and small "universal" gramophone motors.

New Catalogues and Lists

George Crossley, Ltd., Albion Iron Works, Cleckheaton, Yorks.—A comprehensive illustrated catalogue of wire rope and electric cable-making machines, including plant for stranding, armouring, taping, &c.

Heyes & Co., Ltd., Water-Heyes Electrical Works, Wigan.—The "Wigan Review" for July dealing with lighting and advertising the moulded "Lacent" fitting.

Mavor & Coulson, Ltd., 47, Broad Street, Glasgow.—Catalogue No. 17, giving brief particulars of the company's scraper chain conveyors.

British Thomson-Houston Co., Ltd., Rugby.—A series of illustrated descriptive lists dealing with portable insulating-oil testing sets and dryers and filters; air-cooled current transformers and "Selsyn" units.

Bowmak & Co., Ltd., 25, Victoria Street, S.W.1.—Two illustrated and priced pamphlets dealing with "Kitson" rotary pumps.

Watliff Co., Ltd., 175, Merton Road, Wimbledon, S.W.19.—Lists of sizes of the company's standard commutators and slip rings.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.—Catalogue No. 900, containing full particulars of "Siemens" British-made electricity meters.

Wild-Barfield Electric Furnaces, Ltd., Elecfurn Works, North Road, Holloway, N.7.—A well-produced technical brochure and a price list relating to "Telcon" electrical resistance alloys made by the Telegraph Construction & Maintenance Co. and marketed by the Wild-Barfield Co.

Britannia Batteries, Ltd., 233, Shaftesbury Avenue, W.C.2.—A profusely illustrated brochure dealing with the Britannia and Pertrix organisation which produces all types of secondary batteries.

Edison Swan Electric Co., Ltd., 123-5, Queen Victoria Street, E.C.4.—Publications Nos. C.L. 773 and A. 771, dealing respectively with floodlighting and "Ediswan Junior" switchgear and fuseboards.

E. H. Jones (Machine Tools), Ltd., Britannia Wharf, Baldwin Terrace, Islington, N.1.—Leaflet No. 252e, illustrating and describing "Saalfeld" high-speed sensitive and automatic drilling machines.

Bankruptcy Proceedings

A. E. Tinney and **P. E. Gill,** wireless and gramophone dealers, trading as "The Service Radio Co.," 2, Wellington Park, Clifton, Bristol.—The first meeting of the creditors of the above was held on July 11th at the Official Receiver's office, 26, Baldwin Street, Bristol, when the statement of affairs showed a deficiency of £138. The position was attributed to insufficient capital, keen competition, bad trading position, and general trade depression. The case was left in the hands of the Official Receiver as trustee.

G. F. Gilbert, electrical engineer, 60, Nottingham Road, Nottingham.—The first meeting of creditors in this matter was held on July 5th at the Official Receiver's offices, 22, Regent Street, Park Row, Nottingham, when a statement of affairs was submitted which disclosed liabilities of £323 and a deficiency of £245. The case was left in the hands of the Official Receiver as trustee.

C. E. Pittman, electrical contractor and wireless dealer, 49, Birchanger Road, South Norwood, S.E.—Receiving order made July 8th on debtor's own petition.

W. J. R. Ashley ("Southern Wireless Services"), wireless and electrical engineer, 151, London Road, North End, Portsmouth.—Public examination August 8th at the Court House, St. Thomas's Street, Portsmouth.

J. K. Gardner, electrical engineer, 52, Bell Street, Henley-on-Thames.—Public examination August 4th at the Assize Court, Reading.

S. H. Lucas, electrical and radio engineer, 52, Commercial Road, Totton, Southampton.—Public examination August 17th at the Court House, Castle Square, Southampton.

P. F. Chipps, electrical engineer, 6, Oak End Way, Gerrards Cross.—Public examination August 5th at the Town Hall, Windsor.

J. Glickman ("Manchester Radio Service Co."), wireless factor, 10, 12 and 14, Great Ducie Street, Strangeways, Manchester.—Application for discharge to be heard on September 12th at the Court House, Quay Street, Manchester.

W. Sutcliffe, electrical engineer, 40A, Old Church Street, Oldham.—First and final dividend of 3s. 0½d. in the £, payable July 20th at the Official Receiver's office, Byrom Street, Manchester.

S. H. Holly, electrician, 4, South Street, Wareham.—First and final dividend of 4s. 9d. in the £, payable July 25th, at the Official Receiver's office, Midland Bank Chambers, High Street, Southampton.

A. J. Hodges, electrical engineer, 4, Binswood Street, Leamington Spa.—First and final dividend of 4s. 6d. in the £, payable July 25th at Midland Chambers, Warwick Passage, Corporation Street, Birmingham.

Company Liquidations

Louth Electric Service, Ltd.—Meetings August 12th at 155, Norfolk Street, Sheffield, to receive an account of the winding-up by the liquidator, Mr. C. Turner.

Brightlingsea Electricity Supply Co., Ltd.—Meetings August 18th at 167, Strand, W.C., to receive an account of the winding-up by the liquidator, Mr. A. C. Lucas.

A. Cunningham & Co. (Manchester), Ltd.—Meeting, August 9th, at 37, Cross Street, Manchester, to receive an account of the winding-up by the liquidator, Mr. F. Dook.

Private Arrangements

G. Phillips and F. Dart, trading as Phillips and Dart, 3, Rivoli Buildings, Chapel Road, Worthing, electrical engineers.—A meeting of creditors was held in London on July 13th, when a statement of affairs was submitted by Mr. W. Nicholson, which disclosed liabilities of £4,743 and a deficiency of £58. It was resolved that the debtors should execute a deed of assignment in favour of Mr. Wm. Nicholson and Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., as joint trustees. The following are the principal creditors:—Alliance Wholesale, Ltd., £121; Baxter and Caunter, Ltd., £182; Credenda Conduits Co., Ltd., £163; Drake & Gorham Wholesale, Ltd., £670; General Electric Co., Ltd., £452; W. T. Henley's Telegraph Works Co., Ltd., £463; and Joseph Lucas, Ltd., £123.

Winding-up Petition

Edison Bell, Ltd.—In the Companies Court on July 18th Mr. Justice Eve had before him a petition for the compulsory winding up of Edison Bell, Ltd. Mr. Harman, for the petitioning creditors, said the case had stood over for some time to allow a scheme of arrangement to be put forward. A scheme had now been put forward and approved. It involved the formation of a new company, and it would pay a composition to all creditors when it was formed. He asked that the petition might stand over till the end of October.

Counsel for the company said the company possessed very valuable assets, and a receiver was now running the business. His Lordship directed the petition to stand over until October 31st.

Dissolution of Partnership

Brecknock Radio Service, retail wireless apparatus and accessories dealers, 26, Brecknock Road, Islington, N.—Messrs. E. G. H. Davies & P. S. Parmenter have dissolved partnership. Mr. Parmenter will attend to debts and carry on the business.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—OPPOSITION TO SPECIAL ORDER.—The Town Council is holding out for the inclusion of a clause in the Scottish Highlands Electricity Special Order, 1932, giving full protection to the Corporation's electrical interests. At its last meeting the Electricity Committee decided to continue its opposition to the Order.

Australia.—VICTORIAN ELECTRICITY COMMISSION'S NEW BUILDING.—The Victorian Electricity Commission has now taken over the new building which has been erected in Flinders Street, Melbourne, at a cost of £150,000. It is occupied by that section of the undertaking known as the Metropolitan Electricity Supply which took over the Melbourne Electric Supply Co., Ltd., in 1930, and now has more than 138,000 consumers with a consumption of 120,000 000 kWh per annum. Part of the building is used to display household appliances, while cooking by electricity is demonstrated in the basement.

Bedford.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £557.

Birmingham.—NEW CONNECTIONS.—The Electricity Committee reports that during the past quarter 2,479 new connections were made, making a total of 120,747 consumers to date.

Blackburn.—THE WHITEBIRK STATION.—The Corporation has approved the formal purchase of the Whitebirk power station by the Central Electricity Board. The Board has agreed to treat Blackburn as a selected station on the basis of 60 per cent. interest and sinking fund charges, to take over the Blackburn-Preston main transmission line and pay interest and sinking fund charges in respect of this.

EXTENSIONS.—The Electricity Department is applying for sanction to a loan of £3,100 for electricity meters for new housing estates, and is expending £1,078 on supplying electricity to Pleasington.

Bournemouth.—REDUCED CHARGES.—The Bournemouth and Poole Electricity Supply Co., Ltd., has reduced the charge for lighting from 5½d. to 5d. per kWh, with the sliding scale as at present for over 20,000 kWh per annum; for the business two-part tariff the standing charge of 7/6d. per quarter per 100 W of installed lighting capacity has been reduced to 6/3d. per quarter.

Bradford.—ELECTRICITY FOR PUMPING.—The Drainage Committee has authorised the city engineer to change the motive power at the Holme Lane pumping station from gas to electricity.

Bromley.—REDUCED CHARGES.—The Electricity Committee has decided to recommend the following revised charges:—The flat rate of lighting is to be reduced from 5d. to 4¼d. per kWh, while for power for the first 3,000 kWh per quarter the charge is to be reduced from 2d. to 1½d. per kWh; for the next 3,000 kWh from 1½d. to 1d. per kWh, while above 6,000 kWh the charge remains at 1d. per kWh. For a demand of over 30,000 kWh per quarter the charge of £1. 10s. per quarter per kW of max. demand remains, plus ½d. kWh instead of ¾d. per kWh. The all-in tariff for domestic premises is reduced from 8 per cent. on the rateable value, plus 1d. per kWh, or ¾d. per kWh where electric cookers or water heaters are installed, plus meter rent, to a standing charge, including meter rent, of 7½ per cent. on the rateable value, plus 1d. and ¾d. per kWh. All-in tariff for business premises, from £12 10s. to £12 per annum per kW of lighting installed plus ¾d. per kWh, with meter rent abolished.

Canada.—THE ST. LAWRENCE WATERWAY.—An agreement has been reached between Canada and the United States concerning the St. Lawrence power and navigation scheme and awaits ratification by Congress and the Canadian Government. The international section of the river will be divided equally between the Province of Ontario and the State of New York, and Canada and the United States will share equally the expense both of the construction of the waterway and of the power development installation. Canada will, however, receive a credit for the cost of the Welland Canal and other improvements which form part of the scheme. Canada's share in the cost of the electrical installation is to be divided between the Dominion Government and the Government of Ontario.—*Reuter* (Ottawa).

THE ABITIBI SCHEME.—The Ontario Government is to take over the power development at Abitibi Canyon now under construction by the Ontario Power Service Corporation, a subsidiary of the Abitibi Power and Paper Company. Owing to financial difficulties the company appealed to the Government for assistance and as the result of negotiations which have been in progress for some weeks, the Government is to take over and complete the project, which is to be operated by the Hydro-Electric Power Commission of Ontario. The terms of the transfer have not yet been arranged, but the action of the Government assures the continuance of the work in the meantime. The development will have an estimated capacity of 275,000 h.p. and will cost approximately $7,000,000.

Chichester.—LOAN.—The City Council has applied for sanction to a loan of £1,370 for two 2,500-kW Hackbridge regulators.

SUPPLY TO TANGMERE.—It is proposed to extend the supply to Tangmere, from which village thirty-three applications for supplies have been received, at an estimated cost of £700.

Colchester.—LOAN SANCTIONED.—The City Council has received sanction to loans of £6,000 and £8,500, the latter for the construction of spur lines to Brightlingsea, Brantham, and East Bergholt, and for extensions at Tiptree. The former loan is in connection with the completion of an outer ring main.

Continental.—GERMANY.—The total production of the 122 principal power stations was 1,012.7 million kWh during April, and 1,059.2 million kWh during March, as compared with 1,133.2 and 1,266.9 million kWh respectively for 1931. The total for the first four months of the year was 4,289.1 million kWh, as against 4,966.2 million kWh for the corresponding period last year.

Croydon.—SUPPLY IMPROVEMENTS.—The Electricity Committee is to improve the network in South End at a cost of £985.

REFUSE DESTRUCTION.—The Works Committee is considering the provision of a modern destructor plant at South Norwood and has estimated the cost at £30,000 including plant for generating electricity.

Douglas (I.O.M.).—EXTENSIONS.—The Corporation is applying for permission to borrow £50,048 for extensions of electrical plant, mains, etc.

Dover.—BULK SUPPLY.—The Town Council has passed a resolution rescinding a previous decision to install new machinery at the electricity works, and has decided to instruct Mr. Highfield, the consulting engineer, to continue negotiations with the Central Electricity Board for a better offer for a bulk supply, on the ground that figures in a report show that the Corporation is entitled to a more favourable price, and that in the event of failure, application should be made to the Commissioners for permission to install additional generating plant.

Fleetwood.—REDUCED CHARGES.—A reduction in electricity charges, involving the Urban District Council in an annual cost of £3,500, has been decided upon by the Electricity Committee.

Hastings.—LOANS SANCTIONED.—The Electricity Committee has obtained sanction to loans of £11,340 for mains and £4,794 for sub-station equipment.

Irish Free State.—ELECTRICAL DEVELOPMENT POLICY.—The Electricity Supply (Amendment) Bill, 1932, which provides for the construction of additional generating plant at Ardnacrusha (Shannon Scheme) and the Pigeon House Station, Dublin, to meet the anticipated demand up to 1936 or 1937, was read a second time in the Free State Senate last week.

LIMERICK.—The Electricity Supply Board is to lay underground cables in O'Connell Street and Patrick Street, and when this work is completed, the city will be supplied with electricity direct from the Ardnacrusha station. It is expected that the power station in O'Curry Street, which was formerly the property of the Corporation, will be closed down.

Kirkcudbright.—PARTIAL ORDER GRANTED.—In consequence of objections taken to the Galloway electricity scheme, the Electricity Commissioners have intimated that it would not be possible to put through the procedure required in time to allow an Order to be granted before Parliament rose. They have, however, agreed to grant a partial Order to cover the burgh and parish of Kirkcudbright, leaving consideration of the grant of an Order for the remainder of the county to a later date. This partial Order is to be granted consequent on the provisional arrangements made by the County Council with the Central Electricity Board and the Kirkcudbright Town Council, that a supply of electricity should, if possible, be provided for that burgh before next winter. For this purpose the Central Electricity Board has arranged for the extension of the grid line from Kilmarnock *via* Glenlee to Tongland, and has, on the County Council's undertaking, erected a supply line from Tongland to Kirkcudbright.

Leeds.—POWER CHARGES.—The Electricity Committee recommends that the alternative power tariff for consumers whose maximum load is not less than 50 kVA should be amended so as to provide that in any quarter when 5,000,000 kWh and upwards is consumed the "unit" charge should be 0.28d.

Liverpool.—LOAN.—Application is being made by the Electric Power and Lighting Committee for sanction to borrow £300,000 for the provision of extensions of unspecified underground and overhead electric supply mains.

London.—BERMONDSEY.—The London County Council Housing Committee has accepted the offer of the Borough Council to install electric lighting where required in the tenements at Swan Lane. The Committee has also decided to enter into a supplemental agreement with the Council with regard to the wiring and supply of lighting fittings in further blocks of dwellings on the Dickens Estate.

HAMMERSMITH.—The Electricity Committee recommends the allocation of a further £7,000 from the accumulated surplus of the electricity undertaking to finance the assisted wiring scheme.

It is proposed to erect a new sub-station in the Grove district at a cost of £984 and to connect the "North Pole" sub-station with one of the e.h.p. cables from the generating station at a cost of £1,990.

The Council is recommended to approve a proposal to enter into a new agreement with the Chiswick Electricity Supply

Corporation for a bulk supply by the Council to the Corporation.

BATTERSEA.—The Electricity Committee is to provide electricity services to 154 premises at a cost of £1,436.

LIGHTING OF THEATRES, &c.—The London County Council Entertainments Committee has decided not to proceed at present with the proposal to require that one of the two systems of lighting at places of public entertainment should be a self-contained system installed on the premises.

Lowestoft.—LOAN FOR CABLES.—The Electricity Committee is applying for sanction to a loan of £1,600 for l.p. cables for supplying electricity in the northern portion of the borough.

Oxford.—REDUCTION OF CHARGES.—The Town Council has reduced the charge for electricity for motive power as follows:—First 250 kWh per winter quarter, 3d. per kWh; first 250 kWh per summer quarter, 2d. per kWh; next 3,000 kWh per quarter, 2d.; beyond, 1½d. per kWh.

Preston.—PROGRESS OF GRID SCHEME.—The section of the grid line situated between the Ribble power station and Lancaster is now being tested, and the latter town will shortly take a supply from Preston to assist it in giving a bulk supply to a Luneside manufacturing concern.

Reigate.—SUPPLY TO LEIGH.—The Rural District Council has given consent to an application by the London and Home Counties Joint Electricity Authority for a Fringe Order to supply electricity to the parish of Leigh.

Salisbury.—CHANGE OVER.—The City Council has consented to an application by the Salisbury Electric Light and Supply Co., Ltd., to change over the supply from d.c. to a.c.

Seaham Harbour.—LOAN.—The Electricity Committee is to obtain sanction to borrow £500 for the provision of apparatus to be loaned on hire.

South Africa.—EXTENSION POLICY AT JOHANNESBURG.—The Johannesburg Municipal Tramways and Lighting Committee has decided to accept what is known as "Scheme B", which provides for the extension of the existing municipal power supply without a partial supply from outside.

South Wales.—GOWER PENINSULA.—The electrification of the Gower Peninsula has just been commenced by the South Wales Power Co., Ltd., starting with eastern portion and extending westward. Two sets of lines are to be constructed, fed by junctions at Dunvant and Newton, with connections with supply lines from Swansea in case of emergency. Certain sections, it is understood, must compulsorily be completed in two years, while others are to be voluntarily carried out in five years. Arrangements are also being made for large supplies of power for industrial purposes throughout the Amman Valley. The company has also arranged to provide supplies for the Tawe Valley, in addition to the general scheme. It is understood that towns near Swansea (Penclawdd, Three Crosses, Bishopston, and Kiddle) will be electrically lighted before September this year.

Stoke-on-Trent.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £5,600 to supply houses being erected at Carmountside and to works in Brick-kiln Lane at a cost of £340.

LOAN.—The Electricity Committee is to apply for sanction to a loan of £40,000 for mains and services.

Sutton Coldfield.—MAINS EXTENSION.—It has been decided to extend mains at a cost of £299 to houses near Chester Road, Streetly.

Tottenham.—SUPPLY AGREEMENT EXTENDED.—The London County Council Housing Committee has decided to extend the term of the agreement with the North Metropolitan Electric Power Supply Co. for the installation of electricity in houses on the White Hart Lane Estate from ten to fifteen years.

Wallasey.—METERS.—The Electricity Committee is applying for sanction to a loan of £10,000 for meters.

Walsall.—SUPPLY SCHEME.—A scheme for supplying the new Delves Housing Estate with electricity at an estimated cost of £9,500 has been approved by the Town Council.

Weardale.—STREET LIGHTING CONTRACT.—Messrs. F. Reid, Ferens and Co. have secured the contract for street lighting in Upper Weardale, which includes several villages.

West Midlands.—FIRE AT OCKER HILL STATION.—On Saturday last a somewhat serious fire occurred at the West Midlands Joint Electricity Authority's Ocker Hill power station due to a failure of the works power switchgear. The switchgear, which was of the modern compound-filled type, controlled the 7,000-V two-phase supply to the works power transformers and other h.p. circuits in and around the station, and so far as can be ascertained at the moment, the failure was due to a breakdown of an instrument transformer in the switchgear or to a failure of the busbars themselves. The internal explosion which evidently took place blew off one of the cable boxes, thus exposing the busbar chamber from which blazing compound ran out and, passing through the slots in the floor for the cables, set fire to the works power transformers situated in the room beneath. Owing to the nature of the buildings

The hurdle race at the annual sports of Venner Time Switches, Ltd., which were held recently.

and the efforts of the local fire brigades, the fire was generally confined to that part of the building in which the works power switchgear and equipment was placed, but the flames passed through certain openings in the turbine room where some damage was done to cables and l.p. switchgear nearby. Beyond the equipment and cables referred to above, no damage of any kind was done to the main plant or buildings in the power station. In consequence of the interconnection between the Ocker Hill station and the other power stations owned by the Authority at Wolverhampton and Walsall, the occurrence only resulted in an interruption in the bulk supply to the Midland Electric Corporation for Power Distribution, Ltd., for a period of about eight minutes. As a result of the failure of the works power equipment, it was impossible to run any of the auxiliary plant in the power station which as a consequence was totally shut down, but temporary arrangements made it possible to put the power station into service again by Monday morning, the supply in the meantime having been fully maintained from the other stations.

Wolverhampton.—DISPOSAL OF PROFIT.—Through a net profit of £14,156, the Electricity Committee has been able to grant over £8,000 to the relief of the rates, it was reported at a recent meeting of the Town Council. Since 1928 lighting and domestic consumption had increased by 50 per cent., and the number of consumers by 22 per cent., while reductions in the charges had been made equivalent to an income of £30,000 a year.

Workington.—SUPPLY FOR BAKING.—The Electricity Committee has decided to provide a supply for baking purposes to the Workington Industrial & Provident Society, Ltd., as an experiment.

Municipal Supply Undertakings' Results in 1931-32

Town.	Engineer.	Total Revenue.		Working Expenditure.		Net Profit or Loss.		Sales of Electricity.	
		1930–31.	1931–32.	1930–31.	1931–32.	1930–31.	1931–32.	1930–31.	1931–32.
		£	£	£	£	£	£	kWh.	kWh.
Batley	S. D. Jones...	—	—	—	32,216	+ 4,269	+ 5,100	3,955,793	4,087,572
Belfast	F. H. Whysall	—	400,474	—	—	+ 59,852	+ 52,329	69,011,850	70,807,088
Birmingham	F. Forrest	1,899,757	2,019,436	972,398	1,019,836	+116,065	+175,313	359,903,854	388,758,092
Bromley	W. G. Trend	57,959	63,495	32,592	35,477	+ 9,407	+ 9,938	4,469,898	5,528,972
Burnley	J. E. Starkie	—	109,881	70,006	64,073	+ 18,113	+ 19,840	14,228,921	14,531,016
Carlisle	C. W. Salt	101,947	114,062	62,371	63,531	— 7,325	+ 6,887	17,688,773	22,758,992
Coventry	T. R. Whitehead	348,447	364,262	—	—	+ 17,399	+ 38,554	89,828,583	94,642,254
Ipswich	H. E. Blackiston	170,789	179,084	87,075	91,380	+ 23,978	+ 21,847	21,017,724	23,502,653
Kirkcaldy	O. F. Francis	52,081	42,446	16,835	13,766	+ 5,076	— 2,048	7,329,760	6,011,696
Leeds...	C. N. Hefford	740,028	790,307	297,853	322,612	+ 51,592	+ 56,534	147,114,486	153,615,613
Leicester	J. Mould	—	470,233	—	196,768	+ 80,710	+ 65,108	67,860,703	72,241,416
Leigh...	J. B. Hudson	48,740	54,718	32,947	35,051	+ 2,383	+ 6,494	10,179,195	11,613,710
Rotherham	E. Cross	280,576	281,522	137,800	129,396	+ 29,813	+ 35,949	97,922,659	93,185,378
St. Marylebone	C. H. Smyth	547,937	567,936	330,063	344,648	+ 3,873	+ 693	3,910,483	120,703,807
Southport	E. Moxon	102,917	102,062	51,060	54,108	+ 15,977	+ 14,194	14,455,531	15,994,953
Stretford	T. A. Kerr	238,921	255,625	165,351	180,704	— 7,236	— 13,482	71,514,387	79,689,760
Sunderland	C. A. Hopkins	192,348	174,258	—	—	—	— 8,320	34,364,705	29,800,334
Sutton Coldfield	T. Bloore	50,922	55,485	25,120	34,810	+ 4,758	+ 5,187	3,797,407	4,480,573
Walsall	H. A. Howie	128,836	136,121	80,319	84,794	+ 12,466	+ 19,841	20,746,312	21,378,245

Traction

Continental.—FRANCE.—The Metropolitan Railway Company of Paris is planning a large electrification scheme for both inner and outer suburban lines. The first surface line to be taken over by the "Metro" is the line from Luxembourg station, Paris, to Massy-Palaiseau, a distance of 12 miles. The power will be supplied from overhead lines instead of by the third rail system.

The Paris and Orléans Railway Company has recently decided to proceed at once with the electrification of the Orléans-Tours section of its system, a distance of about 73 miles. The company has recently given orders to the Compagnie Electro-Mécanique of Paris and the Compagnie de Fives Lille, for the construction of twenty-five electric locomotives for the haulage of the trains on the Paris-Chateauroux-Tours line. They will each be fitted with four 1,000-h.p. electric motors and regenerative braking.

ITALY.—Work has just been commenced on the construction of an electric cable railway between San Remo and Vetta. The line will be about five miles in length, during the course of which it will rise over 4,000 ft.

SAN MARINO.—To celebrate the inauguration of the new electric railway between San Marino and Rimini, the San Marino authorities are issuing a set of special commemorative postage stamps in four denominations. These stamps, which are being produced by Messrs. Bradbury, Wilkinson & Co., bear a picture of the first train on the new line leaving San Marino. The 20 centesimi stamp is reproduced herewith (actual size).

Croydon.—RENEWAL OF TRACKS.—The Tramways Committee is to renew tracks at stopping places at a cost of £2,025.

Southern Railway.—NEW ELECTRIC SERVICES INAUGURATED.—On Sunday last the extended electric services to Reigate and Three Bridges were put into public commission for the first time. This extension, which is the initial stage of the company's London-Brighton electrification scheme, was described in detail in our issue of July 8th, p. 43.

London.—L.C.C. TRAMWAY ACCOUNTS.—The continued prevalence of unemployment is given as the principal cause of a deficiency of £109,135 on the operation of the London County Council's tramway undertaking during the year ended March 31st last; in the preceding year there was a surplus of £31,637. The total revenue showed a decrease from £4,363,566 to £4,211,603, the gross profit declining from £763,899 to £647,799. The net capital expenditure in 1931-32 amounted to £562,576, bringing the total now invested in the undertaking to £18,914,893, of which £3,304,402 is regarded as obsolete. The total debt incurred amounted to £19,324,944, and the net debt outstanding at March 31st was £8,385,902. The number of passengers carried was 693,303,349, and the number of car miles run was 70,161,864; the corresponding figures for the previous year were 717,386,114 and 70,127,630. The average receipts per car mile fell from 14.61d. to 14.15d.

Southend-on-Sea.—TROLLEY BUS EXTENSION.—The Hamstel Rd. extension of the Corporation trolley bus system has now been completed and it is hoped to commence the service during this month.

Traffic Signals.—Traffic signals are to be provided at Leyton (£400); at Holborn Viaduct, Old Bailey, Newgate Street and Giltspur Street, London (£1,090); parts of Redcar, and at Wallsend-on-Tyne.

Communications

Buenos Aires.—TELEPHONE STRIKE.—The strike of telephone operators, which has lasted for two months, is reported to have been virtually settled. The cause of the strike was the dismissal by the Union Telephone Co. of a number of its employés on the falling-off in constructional work as a result of the financial crisis. On one occasion over 30,000 subscribers had their service cut off by the malicious cutting of the telephone wires. On June 2nd the Minister of the Interior gave instructions to the Labour Department to intervene in the dispute, and it now appears that the efforts at conciliation are nearing success.—*Reuter* (Buenos Aires).

Egypt.—RADIO TELEPHONY.—The agreement between the Egyptian Government and Marconi's Wireless Telegraph Co., Ltd., relative to the public telephone service between England and Egypt, which was inaugurated on June 22nd, has been signed by the British Postmaster-General as third party.

Trial conversations between Cairo and Berlin have taken place as a preliminary to the opening of a direct radio-telephone service between Egypt and Germany.

BROADCASTING.—The agreement by which the Egyptian Government has granted a licence to Marconi's Wireless Telegraph Co., Ltd., to develop a broadcasting service for ten years has been completed. The company will bear the running cost of the transmitting station, estimated to amount to £E.18,000 yearly, and in return will receive 60 per cent. of the income to be derived from receiving licences, the Government retaining 40 per cent. The station will be completed in December.

Great Britain.—RADIO LICENCES.—The number of broadcast radio receiving licences issued by the Post Office up to the end of June last totalled 4,764,188.

RADIO EXCHANGES.—Merthyr Tydfil Town Council has decided to allow the installation of a radio relay service. Wednesbury Town Council has approved the radio relay system in principle, and the Town Clerk is to negotiate for the best offer. Watford Town Council has approved of the application of Broadcast Listeners' Services, Ltd. Chichester City Council has appointed a committee to deal with the matter. Great Yarmouth Town Council has referred the matter to its General Purposes Committee. Deal Town Council has deferred the subject for a further six months. Audenshaw Urban Council has refused an application from a London company for permission to establish a service. The East Ham Works Committee recommends that the British Wireless Exchange, Ltd., be offered a renewal of the existing agreement for a further period of one year and that other applications be not entertained.

London.—NEW TELEPHONE EXCHANGE.—The Bayswater automatic exchange, the telephone equipment for which was supplied and installed by Standard Telephones & Cables, Ltd., was brought into operation by the Post Office on July 16th. The exchange is situated in Moscow Road, Bayswater, W.2. It is at present equipped with 5,000 lines and is capable of extension to 10,000 lines as necessity arises.

POLICE TELEPHONE KIOSKS.—The police telephone box system is being extended in the south-western suburbs. There are now some 150 kiosks in different parts of the metropolis.

G.P.O. ADMINISTRATION.—One of the reforms suggested to the Government Committee which is inquiring into the administration of the General Post Office is that the telephone, telegraph, and radio services (excluding broadcasting) should be separated from the G.P.O. and placed under the control of a statutory authority with independent financial powers. This proposal was included in evidence submitted on behalf of the Association of British Chambers of Commerce, the Federation of British Industries, the National Chamber of Trade, and the National Farmers' Union.

South Africa.—BROADCASTING ADVISORY COMMITTEE.—An Advisory Committee has been appointed to investigate broadcasting in the Union and to make recommendations to the Postmaster-General upon such subjects as programmes, electrical interference, extensions, and developments.

NEW TRANSMITTER.—A new broadcasting station is to be erected at Cape Town by the African Broadcasting Co. to replace the existing station.

Sweden.—TELEPHONY.—The State Telegraph Administration reports that the number of telephone subscribers increased by 23,999 in 1931 and was larger than in any post-war year except 1930, when additions numbered 27,142. At the end of 1931 the total number of telephones connected with the exchanges was 546,453 and the number of exchanges was 4,262. The number of conversations was greater by 4 per cent. than in 1930, but the inland telegraph traffic declined by 3.1 per cent. and the foreign telegraph traffic by 7.3 per cent. The number of broadcast wireless licences greatly increased in 1931, and at the close of the year numbered 549,857. The telegraph department's surplus, which amounted to 25.1 million kronen in 1930, or 7.87 per cent. of the average capital outlay, rose to 26.2 million kronen in 1931, or 7.97 per cent.

United States.—RADIO TELEPHONY.—Radio-telephone service from the United States will be extended to half-a-dozen Central and South American republics bordering on the Caribbean Sea by the end of this year, according to plans of the American Telephone and Telegraph Co. The service will necessitate the establishing of a new radio station at Hialeah, Fla., near Miami. Equipment for the station has been ordered. Among the new countries to be reached by the service is Panama, including the Canal Zone. The latter will be the second outlying possession to be connected with the United States by radio telephone, as service with Hawaii was opened last December. Other Central American republics to be included will be Honduras, Nicaragua, and Costa Rica. The South American countries to be connected are Colombia and Venezuela. The Bahama Islands will also be reached through the new station. With the proposed services in operation the United States will have direct telephone connection with nearly all the countries and islands bordering on what was formerly known as the Spanish Main, as wire service already reaches Cuba and Mexico, and radio telephone service was extended to Bermuda late last year. The additions will bring the total foreign countries within telephone reach of the United States to forty-five.—*Reuter's Trade Service* (New York).

AMATEUR TRANSMITTERS.—The number of licensed amateur radio stations in the United States increased by 40 per cent. during the past year, and there are now 31,859 amateur radio stations in the country compared with 22,739 last year.

West Indies.—CABLE SERVICE.—The Western Union Telegraph Company announces that, by means of arrangements with the connecting lines in the West Indies, direct through working has now been established between New York and Santiago de Cuba, New York and Kingston (Jamaica), and New York and San Juan (Porto Rico). These new arrangements supplement the direct through working between New York and Havana (Cuba) which has been in existence for some time, and should improve communication between Great Britain and Ireland and these important centres.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—August 23rd. Posts and Telegraph Department. Fuses. (A.X. 11386.)*
August 29th. City Council. Five 600-A, 6,600-V, 3-phase, 50-cycle, totally enclosed metal-clad compound-filled switch units. (A.X. 11399.)*
September 20th. 300 miles of telephone wire. (A.X. 11406.)*
September 27th. Vitreous resistances. (A.X. 11412.)*

Bolton.—Corporation. Electrical installation for sessions hall and police building, library, museum and art gallery, and town hall. (July 15th.)

Douglas.—July 30th. Electricity Department. 1,500-kW turbo-alternator and 20,000-lb. water tube boiler. (July 8th.)

Egypt.—CAIRO.—August 15th. Egyptian Government. Electrification of Assouan Dam (£4,000,000).—*Reuter* (Cairo).
September 24th. Ministry of the Interior. Ice-making plant at Minieh, Zagazig, Fayoum, Keneh and Assouan. (A.X. 11414.)*
September 20th. Steel poles, armoured cables, &c. (A.X. 11415.)*

India.—CALCUTTA.—August 1st. Carsac elements for Leclanché cells, and inert dry cells. (A.X. 11400.)*
SIMLA.—August 25th. Indian Stores Department. Lamps. (A.X. 11392.)*

Keighley.—Electricity Committee. Erection of overhead line from Haworth to Oxenhope.

London.—L.C.C. August 8th. Electric wiring and fittings in the staff quarters of eight fire brigade stations. (July 15th.)

Morocco.—RABAT.—August 12th. Shereefian Post Office. Telephone cable. (A.X. 11413.)*

Newport (MON).—July 29th. Electricity Department. E.h.p. switchgear. (July 15th.)

Oswestry.—July 23rd. Electricity Department. Erection of an overhead e.h.p. transmission line, switchgear, and transformer. (July 8th.)

Rhondda.—July 25th. U.D.C. One 150-kVA, one 100-kVA, and three 50-kVA static transformers. (July 15th.)

Sleaford.—August 5th. Electricity Department. Cables, rotary convertor, transformers, kiosks, l.p. ironclad switchboard, &c. (See this issue.)

South Africa.—JOHANNESBURG.—September 1st. Rand Water Board. One 3-phase, 1,750-kVA, 16,500/3,300-V, 25-cycle, oil-immersed outdoor type transformer, and one indoor type, 100-V circuit breaker, suitable for a 16,500-V, 25-cycle supply. (A.X. 11407.)*
CAPE TOWN.—August 17th. Electricity Department. A.c. motors and control gear. (A.X. 11411.)*

Ventnor (I.O.W.).—July 30th. Urban District Council. Electrical illumination of the Cascade Rockery, Shore Hill.

West Riding.—County Council. Installation of electric lighting at High Grange Council School. Mr. F. Willey, county architect, 34, Old Elvet.

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Angus.—County Council. Accepted. Electrical work at the Muirhead of Liff housing scheme (£279).—Stenson & Co.

Bradford.—Electricity Committee. Accepted. Switchgear for controlling works supply transformer, &c., at Valley Road generating station.—A. Reyrolle & Co., Ltd.
Tramways Committee. Accepted. Twenty-four electric tram-car gear wheels (£204).—Metropolitan Vickers Electrical Co., Ltd.

Burton-on-Trent.—Electricity Committee. Accepted. Work in connection with extension of mains to supply Rosliston, Caldwell and Lullington (£4,678).—Johnson & Phillips, Ltd.

Cheltenham.—Electricity Committee. Accepted. Overhead lines to Arle and Uckington (£912).—Johnson & Phillips, Ltd. Overhead line to Staverton (£1,196).—Transmission Lines and Cables Construction Co.

Croydon.—Tramways Committee. Recommended. 100 tons of tram rails.—Dorman Long & Co., Ltd.
Electricity Committee. Recommended. Control apparatus (£1,160).—Metropolitan-Vickers Electrical Co., Ltd.

Dewsbury.—Town Council. Accepted. Feeder pillars (£186).—W. T. Henley's Telegraph Works Co., Ltd. Cables.—Connolly's (Blackley), Ltd. Installation of electric lighting and heating at Flat Iron lavatories (£54), and the wiring of 32 houses at Lees Holm Estate (£185).—W. Angus.

Dorchester.—Town Council. Accepted. Wiring twenty houses for electric lighting (£100).—E. Blackmore.

Dumfries.—County Council. Accepted. Twelve kiosk sub-stations (£1,948).—Crompton Parkinson, Ltd. Switchgear at Gretna (£634).—Harland Engineering Co., Ltd.

Government Contracts.—The following contracts were placed by the various Government Departments during June :—

ADMIRALTY (CONTRACT AND PURCHASE DEPARTMENT).

Electric cable.—Anchor Cable Co.; B.I. Cables; Derby Cables; Ediswan Cables; Enfield Cable Works; G.E.C.; W. T. Glover and Co.; Hackbridge Cable Co.; Henley's; Hoopers Telegraph and I.R. Works; Johnson & Phillips; Liverpool Electric Cable Co.; Macintosh Cable Co.; Siemens Bros.
Electrically driven capstan gear.—Clarke, Chapman & Co.
Electric capstans.—Cowans, Sheldon & Co.
Rotary convertor.—B.T.-H. Co.
Dynamotors.—Small Electric Motors, Ltd.
Switchboard.—Whipp & Bourne.
Switches.—W. McGeoch & Co.; Whipp & Bourne.
Switchgear.—Ferguson, Pailin.

WAR OFFICE.

Dry battery refills.—Britannia Batteries.
Induced draught fans.—Babcock & Wilcox.
Electric lamps.—Stella Lamp Co.
Pumping sets and spares.—Rees Roturbo Mfg. Co.

AIR MINISTRY.

Transmitting and receiving set; voltage regulators.—Marconi's.

CROWN AGENTS FOR THE COLONIES.

Cable.—W. T. Glover & Co.
Switchgear.—Ferguson, Pailin.

POST OFFICE.

Telegraphic apparatus.—Creed & Co.; G.E.C.; Plessy Co.
Telephonic apparatus.—Automatic Electric Co.; Bonnella Bros.; Ericsson Telephones; Phœnix Telephone & Electrical Works; Plessey Co.; Siemens Bros.; Standard Telephones and Cables; Telephone Mfg. Co. (1929).
Testing and protective apparatus and wireless apparatus.—G.E.C.
Battery boxes.—Ericsson Telephones.
Cable.—Connollys (Blackley); G.E.C.; Hackbridge Cable Co.; Henley's; Siemens Bros.
Secondary cells.—Ediswan; Fuller Accumulator Co. (1926); G.E.C.; I.R.G.P. & Telegraph Works Co.; Siemens Bros.
Loading coils.—Siemens Bros.; Standard Telephones and Cables.
Telephone cords.—B.I. Cables; L.P.S. Electrical Co.; Phœnix Telephone & Electric Works; Reliance Electrical Wire Co.; Standard Telephones & Cables.
Meters.—Chamberlain & Hookham.
Flameproof wire.—Concordia Electric Wire Co.; Reliance Electrical Wire Co.
Batteries : Newcastle-upon-Tyne telephonic repeater station and Catterick repeater station.—Pritchett & Gold and E.P.S. Co. Central (Manchester) telephone exchange.—D.P. Battery Co.
Telephone exchange equipment.—Liverpool trunk exchange; Glasgow trunk exchange.—G.E.C. Headington (Oxford area) : Standard Telephones & Cables. Douglas (I. of M.) : Siemens Bros. Leeds automatic area; Barnwood (Gloucester area); Victoria (S.W.); Bristol trunk exchange; Holborn; Nottingham trunk exchange.—Automatic Electric Co. Stamford Hill (N.) : Ericsson Telephones.
Telephonic repeater equipment.—Dover : G.E.C. Glasgow : Standard Telephones & Cables. Sub-contractors for Glasgow : Chloride Electrical Storage Co. for batteries.

OFFICE OF WORKS.

Wiring N.P.L., Teddington.—Gaillard, Robinson & Co.

Great Yarmouth.—Town Council. Accepted. Water screening plant for the electricity works (£808).—Babcock & Wilcox, Ltd.

Hampton.—Metropolitan Water Board. Recommended. Portable electric generator for Hampton waterworks (£354).—Aster, Ltd.

Hyde.—Finance Committee. Accepted. Electric lighting at public hall.—Johnson & Turner, Ltd.

London.—L.C.C. Central Public Health Committee. Accepted. Installation of automatic telephone system at Colindale hospital, Hendon (£800).—T. Clarke & Co., Ltd. Constance Road institution, East Dulwich. Electric lighting, telephones and fire alarms (£794).—A. V. Giffkins & Co., Ltd. Electric lift (£763).—Marryat & Scott, Ltd.
Education Committee. Accepted. Fire alarm and internal telephone systems (£638).—Buchanan & Curwen, Ltd.
Highways Committee. Accepted. Gear wheels.—Metropolitan-Vickers Electrical Co., Ltd. Traction motors and resistances.—English Electric Co., Ltd.
ST. MARYLEBONE.—Electric Supply Committee. Recommended. D.c. and a.c. meters for the year ending September 30th, 1933.—Chamberlain & Hookham, Ltd.; Ferranti, Ltd.
BATTERSEA.—Electricity Committee. Recommended. One 250-kVA transformer (£159).—British Electric Transformer Co., Ltd. Feeder panel and protective gear (£378).—A. Reyrolle and Co., Ltd. Switchgear (£101).—General Electric Co., Ltd.
WESTMINSTER.—Highways Committee. Recommended. Automatic traffic signals.—Automatic Electric Co., Ltd.

Manchester.—Electricity Committee. Accepted. Stores for twelve months. Cotton and silk-covered wires.—Pirelli-General Cable Works, Ltd. Tinned copper wire.—E. & E. Kaye, Ltd. Pure tin fuse wire.—F. Smith & Co., Ltd. Tinned steel binding wire.—L. Andrew & Co. Batteries for flashlight lamps.—General Electric Co., Ltd. Batteries for torchlight lamps.—Ever Ready Co. Cases for flashlight lamps.—General Electric Co., Ltd. Cases for torchlight lamps.—Ward & Goldstone, Ltd. Lamp bulbs for the foreging.—Ever Ready Co. Conduit and accessories for wiring.—Simplex Conduits, Ltd. Auto-transformers.—English Electric Co., Ltd. Auto-balancers.—British Electric Transformer Co., Ltd. Trifurcating boxes.—W. & J. Lawley, Ltd.; Forrest & Sym. Electric canteen equipment, Barton Station.—Credenda Conduits Co., Ltd.; Moorwoods, Ltd.; Jackson Electric Stove Co., Ltd.; General Electric Co., Ltd.; Jackson Boilers, Ltd.; Revo Electric Co., Ltd.; International Refrigerators, Ltd.; Bastian & Allen.

Renfrew.—Town Council. Accepted. Electrical work at housing scheme.—Colquhoun & MacArthur.

Teesdale.—Education Committee. Accepted. Electric lighting of the Cockfield Council School.—T. B. Watson.

Tiverton.—Joint Hospital Board. Accepted. Installation of electric lighting at the isolation hospital (£146).—Stephens, Brain & Co.

Notes

Whitworth Society

The summer meeting of this society was held in Birmingham on July 14th and was attended by nearly fifty members, who travelled by motor coach to the Soho works of Messrs. W. & T. Avery, Ltd., where they examined various relics of James Watt, the great engineer, and subsequently inspected the manufacture of various classes of weighing and testing machines. At luncheon the chair was taken by Prof. Martineau, late of Birmingham University, and later by the president, Prof. F. C. Lea, of Sheffield University, who thanked the company and then inducted the president-elect, Prof. D. A. Low, Emeritus Professor of Engineering at East London College, London University. The party left for the General Electric Company's works at Witton, where they inspected large rotary convertors, steam turbines, transformers, &c., being produced; tea was served, with Dr. Garrard in the chair. Prof. Low thanked the company, and the party then returned by motor coach to Birmingham.

Essays by Apprentices

We are indebted to the Harland Engineering Co., Ltd., for an opportunity to read a prize essay written by Mr. Daniel MacIntyre, one of the company's apprentices, aged 18, for a competition held under the auspices of its Social Club. It is an amazingly original biography of an electric motor "told by the stator" and shows a thorough grasp of the methods of manufacture. Pressure on our space does not permit of reproduction in these columns, but we believe that the method chosen by Mr. MacIntyre is one that might be encouraged by employers and adopted by apprentices with a real sense of humour to prove the liveliness of their interest in their work.

Steel Temper Brittleness

The susceptibility of certain alloy steels to temper brittleness has been investigated by the Manchester Steam Users' Association, whose engineer-in-chief, Mr. V. B. Harley-Mason, has issued a memorandum on the subject and its relation to high-temperature high-pressure steam boiler equipment. The concluding section on the safety of aged boilers shows that their condemnation on the score of age alone is not justifiable.

An Early Electric Lamp

The memorial to Heinrich Goebel

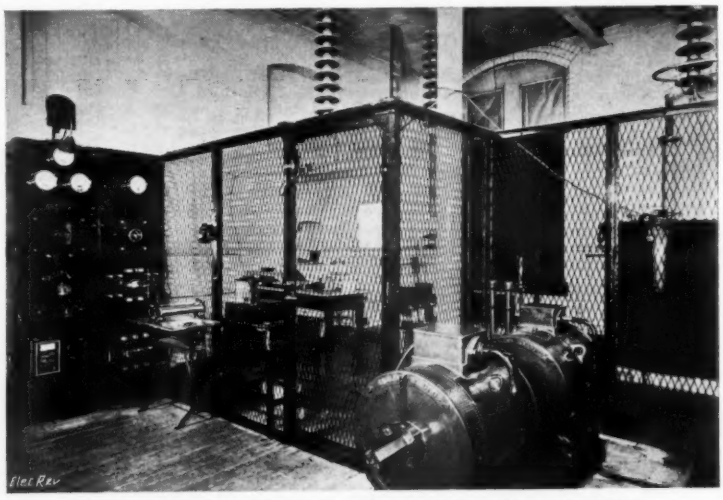
In the small town of Springe in the hilly Weser district of Germany, there is a most remarkable memorial. An electric lamp burns day and night below a tablet at the front of the house in which the watchmaker Heinrich Goebel was born in 1818. At the age of 30, Goebel emigrated to America, and opened a shop in New York. He tried to attract the attention of passers-by to his shop by means of all sorts of physical experiments, one of which was an electric lamp supplied by sixty voltaic cells. Goebel died on September 16th, 1893, shortly after he had won a lawsuit in which one of Edison's companies had accused him of unlawfully manufacturing electric lamps.

New Laboratories at Nottingham

On Saturday last a notable addition was inaugurated at the new University College at Highfields, Nottingham, when Lord Trent, to the munificence of whose father its erection was due, opened a building in proximity to the main structure, which has been equipped with the latest appliances for practical instruction in electrical engineering.

Dr. H. Cotton, head of the Department, explained that there were five laboratories, an elementary and direct current laboratory, an advanced laboratory, and separate laboratories for high-voltage work, standardising and photometry. The buildings are in the same block as the power house and battery room.

The advanced laboratory contains motor-alternator sets of various types and a very good selection of static transformers and of a.c. motors. Dr. Cotton said that the equipment had been selected so as to give as wide and diversified reference as possible and at the same time the terminal arrangements were such that the students had to make all necessary connections for each test and to connect in circuit all the instruments required. Educationally this was infinitely preferable to the alternative scheme employing elaborate switchboards by means of which practically all connections were made permanently and all instruments were already in circuit. The former system ensured that students learned the connection scheme as well as obtaining experimental results, whereas the alternative method emphasised results only, these not being always the most important.



Some of the new equipment at Nottingham University College

In the high-voltage laboratory is a transformer giving a pressure of 150,000 V to earth, the maximum actually attained being 211,000 V. This laboratory is to be used by all full-time students in their final year and also for research work. The College power house at Highfields is a valuable addition to the Electrical Engineering Department. Its primary object is the provision of lighting and power for the College; it is also of maximum value from the educational point of view. Dr. Cotton said that so far as he was aware there was no other college in the country at which this additional training could be given.

Visitors were entertained at a garden party in the picturesque grounds of the College and to tea in the refectory.

Appointments Vacant

Resident engineer for the Hydro-Electric Branch of the Public Works Department of the Punjab Government.

Deputy chief clerk for West Ham Electricity Department.

Sub-station inspectors for the London Electric Railway.

Shift charge engineer for Croydon Electricity Department.

Charge engineer at Ironbridge power station.

(See our advertisement pages to-day.)

E.A.W. Diplomas

The Training and Diploma Committee of the Electrical Association for Women has awarded eleven Grade I (Demonstrator's) Diplomas to ladies in various parts of the country. Applications for the demonstrator's diploma may still be sent in by those who have had four years' experience in the electrical industry. The last date on which applications for the "diploma by form" will be received is January 31st, 1933, after which candidates will be required to satisfy the Committee's examination requirements. Particulars of examinations will be issued at the end of the year. The Committee has decided to institute an "Electrical Housecraft" Diploma for Teachers. The diploma will be awarded to teachers who have had some experience in teaching the use of electrical appliances. This diploma will be made available in the early part of 1933.

The New Lambeth Bridge

On Tuesday His Majesty the King opened the new Thames bridge at Lambeth, which has cost about £550,000. Very effective illumination has been provided for the roadway of the bridge, the scheme having been prepared by the General Electric Co., Ltd., under the direction of Mr. C. A. Baker, chief electrical engineer to the L.C.C.

Two forms of columns are employed. The double-lantern type consists of a concrete pillar equipped with two 200-W lamps and the single-lantern model (500 W) has a metalwork column. The single-lantern units are spaced at 54-ft. intervals and between them and the double-lantern standards there is a distance of 62 ft. The lamps are at about 15 ft. from the ground level. The value of the illumination at the centre of the road varies from ¾ to 1 ft.-candle.

The lanterns have prismatic reflectors and vitreous-enamelled steel over reflectors, while copper screens are fitted to shield the lighting from river craft. Pictures of the new bridge and one of the lighting units appear on page 125.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. D. J. Forster, who has been appointed to a vacancy on the Australian Tariff Board at a salary of £1,100 per annum, was for some time inspecting engineer in Great Britain for the New South Wales Government, and was designing engineer for the Sydney underground railway. For six years he was assistant commissioner of the New South Wales Railways. He is a member of the Council of the Commonwealth Engineering Standards Association and a member of the Institute of Transport, London.

Mr. A. Walker, of the Edinburgh Corporation Electricity Department staff, has been presented by his colleagues with a silver tea and coffee service, on the occasion of his marriage.

Mr. A. R. Chaytor, A.M.I.E.E., is joining the sales department of Switchgear & Cowans, Ltd., Old Trafford, Manchester, on August 1st.

Mr. R. Illingworth, who is to succeed Mr. F. Tait at Poplar

Mr. R. Illingworth, deputy electrical engineer at Plymouth, has been appointed assistant general manager and deputy engineer in the Electricity Department of Poplar Borough Council, at a salary of £900 per annum. Mr. Illingworth, who has had a varied experience, was apprenticed to electrical and mechanical engineering at the workshop of the Blackpool tramways in 1902, and in 1906 joined the Middleton Electric Traction Co., Ltd., as an improver. He left the company in the following year to take up the position of switchboard attendant at the Oldham electricity works, but returned to Middleton in 1912 as charge engineer at the Corporation electricity works. In 1915 he was appointed engineer-in-charge at the Accrington Corporation electricity works, and two years later became engineer-in-charge of Palmer's Shipbuilding & Iron Co.'s gas power station at Jarrow-on-Tyne. In August, 1922, he was appointed chief electrical engineer to Messrs. Cory Bros. & Co., Ltd., Cardiff, with whom he remained until December, 1929, when he was selected from eighty-three applicants for the position of deputy city electrical engineer at Plymouth. We understand that Mr. Illingworth, who will take up his duties on October 1st, was appointed from 126 applicants; he succeeds Mr. F. Tait, who is retiring at the end of the current year.

Mr. A. H. Avery, late London manager for Brook Motors, Ltd., has joined the staff of Collins Electrical, Ltd., and is representing the company on the South Coast from Bournemouth westward, and also in the West of England. Communications to Mr. Avery should be addressed either to "The Haven," Broadstone Lane, Canford Magna, Dorset, or the head office of Collins Electrical, Ltd., 115, Clerkenwell Road, E.C.1.

Mr. A. H. Avery, who is taking up a new appointment

According to the *Irish Press* **Dr. T. McLaughlin,** former managing director of the Irish Free State Electricity Supply Board, has been appointed technical adviser for a period of at least one year in connection with the further development of the Shannon scheme, and it is reported that he is shortly to be reappointed to his old position. He has gone to Germany on a mission on behalf of the Free State Government.

Mr. H. R. Forbes Mackay, general manager of the Sydney (N.S.W.) Electricity Department, will be in London for a few weeks from August 1st next. Communications to him should be addressed c/o Messrs. Preece, Cardew & Rider, 8, Queen Anne's Gate, Westminster, S.W.1.

Mr. D. Lyall, lecturer in electrical engineering at the Fife Mining School, Cowdenbeath, was recently presented with a Westminster chiming clock from the staff on the occasion of his wedding. The principal, Dr. Parker, made the presentation.

Lady Fielding presenting the Gordon M. Campbell Shield at the B.T.-H. sports last week. Mr. G. M. Campbell, director and chief engineer of the B.T.-H. Co. is seen in the centre (in macintosh)

Mr. L. W. Starks, of the staff of the Southampton Electricity Department, who was married on July 9th to Miss D. E. Humby, was presented by his colleagues with an easy chair and a tea service.

Mr. C. R. Daniel has left Messrs. Merz & McLellan and is joining the London staff of Messrs. J. H. Holmes & Co., Ltd., next month.

Mr. Haydn T. Harrison informs us that his private address is now "Anglia," Old Dover Road, Canterbury. He retains his office at 4, Iddesleigh House, Victoria St., S.W.1, but as he is rarely there all communications should be sent to Canterbury.

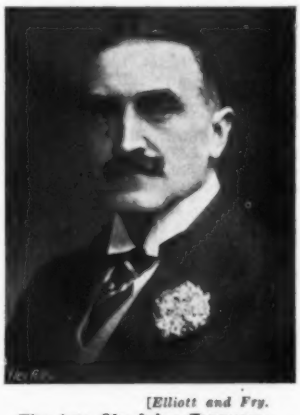
Mr. A. W. Macnamara, founder and managing director of the Telsen Electric Co., Aston, Birmingham, has made a gift of £25,000 to the Birmingham General Hospital to assist the hospital in the acute financial crisis with which the institution is faced at the present time. Mr. Macnamara, who is a native of Birmingham, was a patient many years ago at the hospital. The gift is in acknowledgment of the treatment he received there. Eight years ago Mr. Macnamara started winding transformers, rheostats, and variometers single-handed in a small shed. The business developed at a remarkable rate, and in the new factory, now nearing completion, it is anticipated that there will be 7,000 workpeople engaged in the manufacture of radio apparatus.

Obituary

Ing. Comm. E. Grismayer.—The death is reported from Rome, at the age of sixty-five years, of Ing. Comm. Egisto Grismayer, Professor of Railways and Electric Traction at the Italian Royal School of Engineering in Rome.

Mr. R. H. Saul.—The death is reported of Mr. Robert Henry Saul, A.M.I.E.E., of Cebu, Philippine Islands, which occurred in a London hospital on July 12th.

Sir J. Ferguson.—We regret to record the death of Sir John Ferguson, M.P., which occurred at his country house at Southborough, Kent, on July 18th, at the age of sixty-two years. Sir John, who had been the Parliamentary representative of Twickenham since 1929, was well known in banking circles, but our readers will perhaps better remember him as a director of the India Rubber, Gutta Percha & Telegraph Works Co., Ltd., and of Indeuram, Ltd.



[Elliott and Fry.

The late Sir John Ferguson

Mr. J. W. Bennett.—The death occurred recently, while he was on holiday at Folkestone, of Mr. John William Bennett, of Runcorn, who had been on the staff of the Mersey Power Co., Ltd., for twelve years. He was fifty years of age.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Super Radio (Liverpool), Ltd.—Private company. Registered July 14th. Capital £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical and other instruments and appliances in connection with wireless telegraphy and telephony, &c. The permanent directors are: F. S. Freeman, "Bronwydd," Sandfield Park, Liverpool, wireless factor, and Mrs. P. Freeman. Registered office: 112, Whitechapel, Liverpool.

J. Orton (Electricians), Ltd.—Private company. Registered July 13th. Capital £4,000 in £1 shares (3,500 ordinary and 500 6 per cent. cumulative preference). Objects: To carry on the business of electricians, electrical, mechanical, motor, radio and general engineers and contractors, &c. The subscribers are: J. Orton, 31, Paget Road, Leicester, electrician; R. Orton, 8, Lorrimer Road, Leicester, clerk. J. Orton is permanent governing director and chairman subject to holding £100 shares. Registered office: 60/62, Southgate Street, Leicester.

Walker Fuller & Ellis, Ltd.—Private company. Registered July 14th. Capital £100 in £1 shares. Objects: To carry on the business of wireless and electrical manufacturers and traders, &c. The permanent directors are: H. W. Fuller, 25, Montem Road, S.E.23, wireless dial manufacturer; C. J. Ellis, 16, Ravensbourne Road, S.E.6, works manager.

British Automatic Road Signals, Ltd.—Private company. Registered July 13th. Capital £100 in £1 shares. Objects: To acquire the business of an electrical and mechanical engineer heretofore carried on by A. J. Dexter at 55, Eleanor Street, Grimsby, and also the benefit of certain existing inventions relating to automatic and other street signals and signalling devices for use on motor and other vehicles, &c. The directors are: F. Croft, 55, Eleanor Street, Grimsby: A. J. Dexter, 6, Buller Street, Grimsby. Solicitor: W. West, Grimsby.

Eickhoff Bros., Ltd.—Private company. Registered July 13th. Capital £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in boilers, turbines, winding engines, haulage plant, dynamos, motors, electrical plant and equipment, air compressing plant and machinery, elevators, cranes, &c. The subscribers (each with one share) are: F. C. Winter, 3/4, Clement's Inn, W.C.2, clerk; J. Lovett, 3/4, Clement's Inn, W.C.2, clerk. Solicitors: Buckeridge & Braune, 3/4, Clement's Inn, W.C.2.

Erdington Electrical Co., Ltd.—Private company. Registered July 12th. Capital £2,000 in £1 shares. Objects: To acquire the business of electrical and mechanical engineers carried on by G. A. Lewis and S. T. Lovewell at 255, High Street, Erdington, Birmingham, as the "Erdington Electrical Co." The first directors are: G. A. Lewis, 144, Woodthorpe Road, King's Heath, Birmingham, electrical engineer (chairman); S. T. Lovewell, 7, Park Hill, Moseley, Birmingham, electrical engineer; A. D. Butler, 125, Church Road, Erdington, Birmingham, electrical engineer (all permanent).

Smith Bros. (Caer Conan) Wholesale, Ltd.—Private company. Registered July 15th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless apparatus, electrical fittings, appliances, gramophones, &c. The subscribers (each with one share) are: R. C. Lambert, "Dunster," Wickersley Road, Rotherham, and J. Geary, 2, Standon Road, Wincebank, Sheffield, accountants. M. A. Copley signs document as director and secretary. Solicitors: Jackson & Jackson, 29, High Street, Rotherham.

A. Warner & Son, Ltd.—Private company. Registered July 15th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturing wireless components and wholesale radio and electrical distributors, &c. The directors are: A. Warner, M.I.E.E., and Mrs. E. Warner, 7, Howard Road, Walthamstow, E.17. Registered office: 201, Forest Road, Walthamstow, E.17.

Returns of Electrical Companies

Partridge & Mee, Ltd.—Grant of rights of way containing a charge dated June 21st, 1932, as further security for £3,000 secured by mortgage dated February 12th, 1932. Property charged: land forming part of Percy Road Extension, Leicester. Holders: Leicester Permanent Building Society.

Fairbank Radio, Ltd.—Particulars filed of £1,000 debentures authorised June 20th, 1932, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £300.

East Midland Electrical Co., Ltd.—Particulars filed of not more than £3,000 debentures authorised July 1st, 1932, charged on the company's property, present and future, including uncalled capital, the whole amount being now issued.

Aberayron & District Electricity Supply & Power Co., Ltd.—Satisfaction to the extent of £1,400 on April 27th, 1932, of debentures authorised by resolution dated November 29th, 1923, and registered December 13th, 1923. (According to the register of mortgages, the debentures registered December 13th, 1923, originally secured £1,400. (Notice filed July 5th, 1932.)

Debenture dated June 30th, 1932, to secure £900, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. E. G. Richards, "Hillcrest," Aberayron.

David Shanks & Co., Ltd.—The nominal capital has been increased by the addition of £2,000 in £1 ordinary shares beyond the registered capital of £2,000.

Hadden & Pearce, Ltd.—H. Rainsbury, F.S.A.A., of 20/21, Broad Street Avenue, E.C.2, was appointed receiver and manager on June 21st, 1932, under powers contained in debenture dated April 19th, 1928.

Wolf & Morgan, Ltd.—Winifred S. Welsh, of 56, Maury Road, Stoke Newington, N., ceased to act as receiver and manager on July 4th, 1932.

South Metropolitan Electric Tramways & Lighting Co., Ltd.—Capital £600,000 in 200,000 preference and 400,000 ordinary shares of £1 each. Return dated March 10th, 1932. All shares taken up. £565,110 paid on 200,000 preference and 365,110 ordinary shares. £34,890 considered as paid on 34,890 ordinary shares. Mortgages and charges, £128,291.

Windsor Electrical Installation Co., Ltd.—Capital £150,000 in 50,000 1st preference, 25,000 2nd preference, 50,000 ordinary and 25,000 unclassified shares of £1 each. Return dated March 8th, 1932. 23,532 1st preference, 25,000 2nd preference and 50,000 ordinary shares taken up. £73,532 paid on the 1st preference and ordinary shares. £25,000 considered as paid on the 2nd preference shares. Mortgages and charges, nil.

Westminster Electric Supply Corporation, Ltd.—Capital £2,000,000 in 550,000 preference and 1,450,000 ordinary shares of £1 each. Return dated March 8th, 1932. 550,000 preference and 1,435,676 ordinary shares taken up. £1,305,620 paid on 550,000 preference and 755,620 ordinary shares. £680,056 considered as paid on 680,056 ordinary shares. Mortgages and charges, nil.

Charles White Electrical Co., Ltd.—Capital £3,000 in 2,000 "A" and 1,000 "B" shares of £1 each. Return dated February 5th, 1932. 1,550 "A" and 1,000 "B" shares taken up. £1,050 paid on 50 "A" and 1,000 "B" shares. £1,500 considered as paid on 1,500 "A" shares. Mortgages and charges, nil.

E. P. Allam & Co., Ltd.—Capital £6,000 in £1 shares. Return dated March 14th, 1932. 5,000 shares taken up. £2 paid. £4,998 considered as paid. Mortgages and charges, nil.

Northampton Electric Light & Power Co., Ltd.—Capital £1,000,000 in 75,000 preference and 925,000 ordinary shares of £1 each. Return dated March 11th, 1932. 52,580 preference and 625,000 ordinary shares taken up. £677,500 paid. Mortgages and charges at date of return: £400,000. Since issued: £63,000 debentures (part of a series of £100,000, in addition to the £400,000 already registered). A return of allotments made up to March 23rd, 1932, shows a further 1,473 ordinary shares allotted for cash.

Electrical Distribution of Yorkshire, Ltd.—Capital £1,900,000 in £1 shares. Return dated March 15th, 1932. 1,500,000 shares taken up. £1,500,000 paid. Mortgages and charges, nil. A return of allotments made up to April 13th, 1932, shows a further 400,000 shares allotted for cash.

City Notes

The British Electric Transformer Co., Ltd., reports a loss of £25,945 for 1931; the loss for 1930 was £32,535. In view of the continued fall in prices of raw materials and the accentuated trade depression, it is considered necessary to write down the stocks of materials and manufactured goods by £63,568, including provision for certain contingent liabilities, &c., bringing the total debit of the profit and loss account to £89,512. The accounts have been delayed by negotiations with Messrs. Crompton Parkinson, Ltd., with regard to a scheme of reconstruction. Details of this scheme were circulated with the report, and may be summarised as follows:—The present capital of the British Electric Transformer Co. is £625,000 divided into 300,000 7 per cent. cumulative preference and 325,000 ordinary shares of £1 each. It is proposed to reduce this to £190,625 by cancelling 10s. of each of the preference shares and 17s. 6d. of each of the ordinary shares. The reduced capital will then be converted into one class of 5 per cent. cumulative preference shares. All arrears of dividend on the preference shares to December 31st, 1932, will be cancelled, and the capital will be restored to the original figure by the creation of 1,737,500 new ordinary shares of 5s. each of which 40,000 will be issued as fully paid to Crompton Parkinson, Ltd., the balance remaining unissued for the time being. Crompton Parkinson, Ltd., are to sell and transfer their transformer department to the B.E.T. Co. as from July 1st, 1932. The consideration for the acquisition is fixed at £40,000 to be satisfied by the allotment of the above-mentioned fully paid ordinary shares. The company's articles of association are to be altered in several respects, and upon completion of the transfer Crompton Parkinson, Ltd., are to execute a trust deed under which they will guarantee the dividend upon the new preference shares. This guarantee will take priority over all classes of shares in Crompton Parkinson, Ltd. Crompton Parkinson have also entered into a contract with Berry's Insulating and Building Products, Ltd., conditional upon the scheme becoming absolute, to purchase from that company all the issued shares of Berrite, Ltd., for 15,070 fully paid "A" ordinary shares of 5s. each in Crompton Parkinson, Ltd. Consequent upon Crompton Parkinson acquiring control Mr. Frank Parkinson will become chairman of the B.E.T. Co., and Mr. Albert Parkinson, Mr. E. C. Holroyde, and Col. Hardie will join the board. The present chairman, Mr. A. F. Berry, will be deputy-chairman, and Mr. F. E. Berry will also remain a director. In order to deal with the existing bank overdraft and other pressing liabilities and to provide adequate working capital the company's bankers are to advance £220,000 secured by a debenture. Meeting: August 8th.

Cables-Wireless Merger Reports.—The revenue account of Cables & Wireless, Ltd., for 1931 shows that the dividends receivable from subsidiary companies amounted to £724,048 and transfer fees to £2,011, making a gross revenue of £726,059. The profit, after payment of general expenses, interest, &c., amounted to £636,168, against £1,302,385 in 1930, to which is added £66,907 brought in, making £703,075. It is proposed to pay a dividend of 2¾ per cent., less tax, on the cumulative preference stock, leaving a balance to be carried forward of £64,689.

The accounts of Imperial & International Communications, Ltd., show a gross revenue for 1931 of £4,979,023, as compared with £5,639,770 in 1930, and a profit of £75,535 (against £326,248). The balance brought in is £20,130, making £95,665, and it is proposed to pay a dividend of 5s. per cent., leaving £20,665 to be carried forward. The report states that the Committee that was appointed by the Advisory Committee in consultation with the Court of Directors has presented its report, and its recommendations have been the subject of discussion and negotiations, which are still in progress. The governor of Cables & Wireless, Ltd., was to make a statement at yesterday's meeting of the company regarding the position. As has already been announced, Sir Basil Blackett has resigned his position as Government-approved director of Cables & Wireless, Ltd., and Government-approved chairman of Imperial and International Communications, Ltd., as from April 19th last. He has, however, agreed to remain an ordinary director. The death of Lord Inchcape is recorded.

Aron Electricity Meter, Ltd., held its annual meeting on July 15th, when Mr. H. Kahn (chairman), who presided, in the course of his speech said with regard to the outlook for 1932, that so far as the London factory was concerned, prospects seemed good. Their factory had been completely reorganised for mass production on modern lines, and both their new house meter and their prepayment meter were now standardised. Beside this, they were still manufacturing large clock meters and kVA meters to meet special requirements. Up to date, orders for their new house and prepayment meters had been coming in well, and they had considerably increased their turnover. The profits for the current year, in the absence of any untoward eventualities, should show a considerable increase. The taximeter business showed no improvement, and, if anything, they expected smaller profits this year. As regarded the Austrian factory, in the present chaotic state of affairs in Austria, it was impossible to say what the future would be, but in any case, there would be a further loss this year, and unless the other European nations saw their way to assist Austria, conditions there must go from bad to worse.

Petters, Ltd.—Presiding at the annual meeting on July 14th, Sir Ernest W. Petter (chairman) said that if there had been any genuine rift in the clouds of international business, or any sign of real life returning to export trade, they might have felt justified, in view of the strength of the financial position, in recommending an ordinary dividend, but during the three months of the current financial year which had already passed there had been no improvement. A few years ago they formed a company in Argentina, opened showrooms, and appointed a staff to carry on the business. As a result they built up a considerable trade in that country. The position of Argentine exchange and the general trading conditions during the last two years, however, became such that they had no alternative but to scrap everything they had done and to write off large sums for losses incurred in consequence. Very similar conditions had arisen with more or less severity in many other countries where they had built up good connections. During the past year they had completed their series of atomic Diesel direct-reversing marine oil engines and had also completed the experimental stage of a two-cycle, high-speed compression-ignition engine, intended for use on road vehicles, marine propulsion, and for electric generating sets. The aircraft works had been fairly well employed during the year under review, but at the present time they were suffering from a marked shortage of orders.

The Dubilier Condenser Co. (1925), Ltd., reports a loss for the year ended March 31st last of £12,193, as compared with £20,918 in the preceding year. In addition the works has been reorganised to take care of new products at a cost of £1,591, and reserves have been set up for depreciation of stocks, losses of subsidiary companies, for redistribution and disposal of unwanted plant and for bad debts (£23,409), making the total debit balance for the year £37,193, which with the adverse balance brought in makes a total debit of £81,845. Meeting, July 26th.

The Kalgoorlie Electric Tramways, Ltd.—Presiding at the annual meeting on July 18th, Mr. C. C. Baker (chairman) said that the traffic receipts during the year showed an advance over the preceding year of £3,768, the reason for this being the improved state of the gold-mining industry in Western Australia, which had brought a good many mining people to Kalgoorlie and helped to increase their traffics. They were working under three concessions and they had secured the extension of all three until December, 1945. Since the close of the accounts, traffics continued to be satisfactory and progressive.

Oliver Pell Control, Ltd., reports a net profit for the year ended March 31st last of £8,684. From this is deducted a debit balance of £5,389 brought in, and after writing off preliminary expenses (£738) and contributing £73 to the staff provident fund, a balance of £2,484 is carried forward, from which a full half-year's preference dividend is to be paid. The report states that sales increased by 20 per cent. as compared with the preceding year, and the orders in hand are substantially in excess of those at the corresponding date last year. Meeting: July 28th.

The Eastern Extension, Australasia & China Telegraph Co. reports an income for 1931 of £369,278, as compared with £468,366 in the preceding year. Expenses and interest on mortgage debenture stock totalled £39,578, leaving a balance of £329,700, to which is added £1,092 brought in, making £330,792. It is proposed to pay a dividend of £3 5s. per cent. (against £12 8s. per cent.) on the ordinary stock, and to carry forward £792.

The Direct Spanish Telegraph Co., Ltd., reports that after providing for all expenses and adding £2,456 brought in there is a profit for 1931 of £14,869 (against £11,335 in 1930). The ordinary dividend is maintained at 6 per cent., debenture redemption account receives £6,000 and £1,990 is carried forward. Meeting: To-day (Friday).

The Brazilian Traction, Light & Power Co., Ltd., held its annual meeting in Toronto recently, when Mr. M. Lash (president), in the course of his speech, said that the businesses of the operating companies were holding up well under the exceptional conditions prevailing in Brazil, some of the services showing increases over the previous year. The board had declared a stock dividend of 2 per cent. on the ordinary shares, payable on September 1st next. There was an important increase in the number of individual shareholders, the total now being about 40,000.

The German Bergmann Co.—It is estimated that between 75 and 80 per cent. of the capital of 44,000,000 marks issued by the Bergmann Electricity Works Co. is held by the A.E.G. and the Siemens group. The holders of the difference of between nine and eleven million marks are now being invited by these two companies to dispose of their shares at the price of 21 per cent. which would involve an outlay of about two million marks by the A.E.G.-Siemens group.

The Smithfield Markets Electric Supply Co., Ltd., has declared the usual ordinary interim dividend of 3 per cent., less tax. The company has informed its shareholders that the City Corporation has given notice to determine the contract under which the company supplies electricity to the Central Markets.

The Metropolitan Railway Co.—At an extraordinary meeting of the holders of consolidated and preference stock held on July 14th a resolution was passed approving the terms for the withdrawal of the company's opposition to the London Passenger Transport Bill.

Thomas de la Rue & Co., Ltd., report a profit for the year ended April 2nd of £2,659, as compared with a loss in the previous year of £35,263. The expenses of capital reduction (£1,204) are to be written off and £1,455 is carried forward. Meeting: July 27th.

The Anglo-American Telegraph Co., Ltd., has announced an interim dividend for the quarter ended June 30th of 15s. per cent. on the ordinary stock and £1 10s. per cent. on the preferred ordinary stock.

The Great Northern Telegraph Co.'s Holding Co., Ltd., proposes to distribute for the year ended June 30th last a total dividend of 19½ per cent. or Danish kroner 10.53 per share of Kr. 54, to set aside Kr. 200,000 for taxes and to carry forward Kr. 12,324.

The Shawinigan Water & Power Co. has declared the regular dividend of 25 cents per share on the common shares of no par value for the quarter ended June 30th.

Allen West & Co., Ltd., announce that the dividend due on July 31st on the 7 per cent. cumulative participating preference shares has been deferred.

The Telephone & General Trust, Ltd., has announced a dividend of 3½ per cent., actual, less tax, on the preferred ordinary shares, and at 7 per cent. per annum for the half-year ended June 30th on the 7 per cent. cumulative preference shares.

The Mansfield & District Tramways, Ltd., reports that after deducting interest charges and the debenture redemption allocation from earnings, a balance of £18 is carried forward.

The Chelsea Electricity Supply Co., Ltd., has declared an interim dividend of 3 per cent. on the ordinary shares (against 4½ per cent.).

The County of London Electric Supply Co., Ltd., has declared an interim dividend of 3 per cent. on the ordinary shares (same). The new ordinary shares issued in April last do not rank for this dividend.

The South London Electric Supply Corporation, Ltd., has declared an interim dividend of 3 per cent (same) on the ordinary shares.

The London Electric Supply Corporation, Ltd., has announced an interim ordinary dividend at the rate of 6 per cent. per annum for the six months ended June 30th (equivalent to 7.2d. per share), less tax at 5s.

Herbert Morris, Ltd., have announced the full half-year's dividend to July 31st on the 6 per cent. and 5 per cent. cumulative preference shares.

Stocks and Shares

TUESDAY EVENING.

THE great conversion plan goes steadily on its way, each day contributing its quota to the success that is well in sight. The effect of this ultimate result is seen in the strength shewn by the markets for all investments securities.

Another cause for hopefulness, and one of very practical order, is the Conference at Ottawa, upon which the eyes of the British Empire are now fixed. So great has been the expectation formed in advance of what Ottawa may provide in the shape of a stimulus to Empire trade that some people are already asking whether its achievement, whatever that may be, is not already discounted. Stock Exchange prices, which make a very fair index to general anticipation in such matters, show a tendency to improve still farther upon the striking advances that they have secured during the past three or four weeks. The Electricity Supply group, in which the price of practically every share has risen substantially this month, again shows advances.

The Home Railway Market

Metropolitan consolidated has at length halted in its upward stride, and at 61½ shows no movement as compared with a week ago. Central London assented stocks are a trifle easier at 79½. Underground Electric ordinary have receded to 18s., which leaves the price the same as it was before the announcement of reduction in the dividend on the shares. The prior charge stocks in this group hold their prices, Metropolitan 3½ per cent. debenture stocks being quoted at 81 ex dividend, while London Electric 4 per cent. debenture is two points higher at 96. Central London 5 per cent. debenture retains its rise at 110. The latest issued 5 per cent. debenture stocks of the Metropolitan and the Metropolitan District Companies are both better at 111¼.

Cables and Wireless

The report of Cables and Wireless has now made its appearance and the figures of this eagerly awaited statement are

being discussed with lively interest and a certain conflict of opinion. In some directions they are regarded as being decidedly satisfactory; other people seem to regard them as somewhat disappointing. The net profit of £636,168 is £670,000 down as compared with that of a year ago, and it fails to cover the preference dividend, now declared, by £2,218. This, of course, is a bagatelle to the company and is provided by the carry-forward.

The meeting of the Cables and Wireless is being held this week, and the Governor has promised to make a statement regarding the position that has been reached by the Advisory Committee. The Advisory Committee's report has been presented, and its recommendations, according to the Cables and Wireless report, are now the subject of discussion and negotiation. The price of the preference stock is a point better, at 60½. There is a good deal of speculation still going on in the trio.

Anglo-American Telegraph preferred has risen two points to 99½, and the deferred stock at 24 repeats its previous rise of 1½. Globe Telegraph and Trust eased off to 7 after its dramatic rise of a week ago.

In the American group, American Telephone and Telegraph shares at 102½ have recovered 2½ points. The company has declared its usual quarterly dividend of $2.25, being at the rate of 9 per cent for the year. Internationals strengthened to 7¼, but reacted to 6½. Marconi Marines have advanced to 28/3.

Electricity Supply Shares

Changes in the list are fewer this week than they have been so far in the current month, but they continue in the same upward direction.

Bournemouth and Poole in the provincial group have risen to 66s. 3d., and Electrical Distribution of Yorkshire to 38s. 3d. ex dividend. Of the London shares St. James' and Pall Mall ordinary at 31s. 6d. ex dividend are 2s. to the good. Chelseas improved to 31s. 6d. The company has declared an interim dividend of 3 per cent. on the ordinary shares payable on September 15. This goes against 4-1/6 per cent. before the 7 per cent. standard rate came into force. County of London repeats its 3 per cent. interim dividend, the same as that of a year ago. The new shares are better at 6s. 7½d. premium.

A number of debenture stocks are better. Charing Cross 4 per cent. debenture at 97½ is 5 points up; St. James' and Pall Mall debenture rose a similar amount to 92½. County of London debenture at 116 is 2 points higher. Bournemouth and Poole 4½ per cent. debenture rose 1½ to 104½. Metropolitan 4½ per cent. debenture at 104½ is 1 higher, and of the 3½ per cent. stocks St. James' at 87½ shows a gain of 6 points on the week. Yorkshire 5 per cent. debenture advanced to 110. London and Home Counties 4½ per cent. debenture is up 3, to 106½. On the other hand, Central Electricity 4½ per cent. debenture has eased off to 8 premium.

Dollar Stocks

Canadian issues continue dull. Dollar stocks as a whole have gone back, although, as an exception, Mexican Light and Power common shares have advanced 2½ to 7½. British Columbia Power "A" shares strengthened to 24. Montreal Light and Power at 37½ are down 1½ and Power Corporation of Canada are equally lower at 11½. Shawinigan receded to 16½. Brazilian Tractions moved abruptly, but within narrow limits. The price at 12¼ shows a gain of the fraction. Rio Tramways 50-year mortgage bonds put on a point, at 74½.

Tramway and Traction

London United Tramway debenture has risen to 57½; London and Suburban Traction preference hold their 3s. rise at 8s. 3d. A number of the provincial Electric Tramway issues have improved, Bath Electric debenture, for instance, rising 6½ to 77½. Yorkshire West Riding Electric debenture at 67½ shows a gain of 5 points and Potteries Electric debenture at 97½ is 13 higher on the week.

In the foreign group, improvements have occurred in British Columbia Electric debenture, where the stock has risen to 90½. Calcutta 1st debenture is up 5 to 87½. Madras Electric preference at 15s. are 1/16 higher. The Kalgoorlie Electric Tramways, as the report indicates, is doing well, as at the meeting early this week the chairman had a satisfactory account to give of the company's prospects.

Manufacturing and Equipment

Henley's ordinary shares at 5 15/16 are ex dividend and bonus, allowing for which the shares show a modest rise. General Electric ordinary strengthened to 41s. 3d. Amongst the lower-priced shares English Electric ordinary and preference are both 1/16 up at 10s. and 11s. 3d. respectively. Associated Electrical Industries ordinary are unchanged at 18s. 9d. Callender's, Enfield Cables, Johnson and Phillips and Siemens hold their rises of last week. In the iron and steel list, Babcock and Wilcox are a shade lower at 2⅛, though Vickers show a slight gain at 5s. 7½d.

It may be of service to mention as being on offer, in the market, 5,000 Shropshire, Worcestershire 6 per cent. preference at 26s. 9d. Dividends are payable in March and September, and at the current price the yield is £4 9s. 9d. per cent. on the money. A thousand Calcutta Electric also can be obtained at 26s. 3d., with March and September dividend. The latter are 5 per cent. free of tax. The gross yield is £5 1s. 6d. per cent.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1930.	1931.	Price. July 19.	Rise. or Fall.	Yield. p.c. £ s. d
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	66/3	+1/9	4 10 7
Brompton Ordinary	1	8½	8½	30/6	—	4 11 10
Central Electricity 4½% Deb.	Stock	4½	4½	102½	—	4 7 10
Charing Cross Ordinary	1	8½	8½	30/6	—	4 11 10
Chelsea	1	8⅞	8⅞	31/6	+1/6	4 9 0
City of London	1	10	10	42/6	—	4 14 1
Clyde Valley	1	8	7	29/6	—	4 15 0
County of London	1	11	10½	50/-	—	4 4 0
Edmundsons' 7% Pref.	1	7	7	28/6xd.	+6d.	4 18 3
Elec. Dis. Yorkshire	1	9	9	38/3xd.	+9d.	4 14 1
Elec. Supply Corporation	1	11	11	51/3	—	4 5 7
Kensington Ordinary	1	8	8	33/6xd.	+3/-	4 6 2
Lancs. Light and Power	1	6½	7	28/3	—	4 19 0
London & Home Counties 4½% Deb.	Stock	4½	4½	106½	+3	4 4 6
London Electric	1	9	9	31/6	+6d	4 9 0
Metropolitan	1	10	10	43/9	—	4 11 6
Midland Counties	1	7	7	31/3	—	4 9 7
Mid. Elec. Power	1	8	8	32/-	—	5 0 0
Newcastle-on-Tyne Ordinary	1	6	6	25/-	+6d.	4 16 0
Do. 7% Pref.	1	7	7	30/6	+1/6	4 11 10
Northampton	1	10	10	45/-	—	4 9 0
Notting Hill 6% Pref.	10	6	6	12	—	5 0 0
North Met. Elec. 6% Pref.	1	6	6	28/-	—	4 5 9
St. James' and Pall Mall	1	8	8	31/6xd.	+2/-	4 9 0
Scottish Power	1	8	—	31/3	+6d.	5 2 5
South London	1	8½	8½	31/-	—	4 10 4
Urban Ordinary	1	7	—	28/9	—	4 17 5
Westminster Ordinary	1	8½	8½	31/-	+6d.	4 10 4
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	13/3	—	11 6 4
Yorkshire Elec.	1	8	8	37/-	—	4 6 6
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	79½	-½	5 0 8
Metropolitan	,,	3½	2½	64½	—	3 17 6
Do. District	,,	5	4½	51½	—	8 14 10
Underground Electric	1	8	7	18/-	-6d.	7 15 6
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	102½	+2½	8 15 8
Anglo-Am. Tel. Pref.	Stock	6	6	99½	+2	6 0 7
Do. Def.	,,	1½	1½	24	+1½	6 5 0
Cables & Wireless 5½% Pref.	,,	5½	2½	60½	+1	4 11 0
Do. A 7½% Ord.	,,	—	Nil	18½	—	—
Do. B Ord.	,,	—	Nil	9	—	—
Globe Tel. and T. Ord.	10	8½	Nil	7	-½	—
Do. do. Pref.	10	6	6	10	—	6 0 0
Great Northern Tel.	10	20	20	25	—	8 0 0
Marconi-Marine	1	15	10	28/3	+9d.	7 1 7
Oriental Telephone Ord.	1	12	12	2⅞	+⅛	*4 18 6
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	—	—	3/9	—	—
Do. do. 2nd Pref.	5	—	—	3/9	—	—
Do. do. 5% Deb.	Stock	—	—	7	—	—
British Electric Traction Def. Ord.	,,	5	5	325	—	—
Do. do. Pref. Ord.	,,	8	8	135½	—	5 18 1
Brazil Traction	100	—	—	12¼	+¼	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	94½	—	5 5 10
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/3	—	—
London United Tram Deb.	Stock	4	4	57½	+1	6 19 2
Mexico Trams, 5% Bonds	—	5	5	22½	—	30 5 10
Mexican Light Common	100	Nil	Nil	7½	+2½	—
Do. 7% Pref.	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	48½	—	10 6 2
Victoria Falls Ord.	1	15	15	66/3	—	4 10 8
Yorkshire (West Riding)	1	Nil	Nil	5/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	6	4	18/9	—	4 5 4
Do. Pref.	1	8	8	31/3	—	5 2 5
Babcock & Wilcox	1	15	14	42/6	-⅛	6 11 9
British Aluminium Ord.	1	10	5	22/-	-3d.	4 11 0
British Insulated Ord.	1	15	15	60/-	—	5 0 0
Brush Ord.	Stock	5	Nil	47	—	—
Callender's	1	15	15	58/9	—	5 1 10
Do. 6½% Pref.	1	6½	6½	26/3	—	4 19 1
Crompton Parkinson Ord.	5/-	30	24	17/6	—	6 17 2
Do. 8% Pref.	1	8	8	30/-	+½	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	92½	—	5 8 1
Electric Construction	1	Nil	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	3⅜	—	6 18 1
English Electric	1	Nil	Nil	10/-	+⅛	—
Do. do. Pref.	1	Nil	Nil	11/3	+⅛	—
Ever Ready	5/-	35	35	24/-	-3d.	7 5 10
Ferranti Pref.	1	7	7	23/9xd.	—	5 18 0
G.E.C. Pref.	1	6½	6½	28/6	—	4 11 3
Do. Ord.	1	10	8	41/3	+6d.	3 17 6
Henley's	1	30	30	5 15/16xd.	-⅛	5 1 1
Do. 4½ Pref.	5	4½	4½	4½	—	4 14 9
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	10	5	½	—	5 14 3
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	Nil	Nil	10	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1930

19287. "Thermionic valve holders and the like." C. R. Cook. March 24th, 1931. (375332.)

1931

1799. "Synchronous electric motors." G. W. Walton. January 19th, 1931. (375339.)

2581. "Electric switches with gas blast blow-out." S. Ruppel. January 27th, 1930. (375364.)

4613. "Plugging contacts." British Thomson-Houston Co., Ltd., H. E. Cox, M. C. I. Hunter, and F. A. Tuck. February 13th, 1931. (375285.)

5023. "Electric motor control." British Thomson-Houston Co., Ltd., E. B. Tuppen and F. E. Butler. February 17th, 1931. (375340.)

5774. "Electric door operator." Waygood-Otis, Ltd. (Otis Elevator Co.). February 24th, 1931. (375369.)

5832. "Electric regulating switches with spring contacts." A. W. Ulitowsky and N. Levitzky-Rogalia. February 24th, 1931. (375343.)

6159. "Automatic method of taking and recording radio directional bearings." G. H. Farnes. February 27th, 1931. (375372.)

7374. "Electric motor control systems." Westinghouse Electric & Manufacturing Co. March 17th, 1930. (375344.)

8026. "Fusion of substances in electric furnaces." Electric Furnace Co., Ltd. March 15th, 1930. (375304.)

8156. "Alternating current signalling systems." L. E. Ryall. March 17th, 1931. (Cognate application 19905/31.) (375346.)

8304. "Electric signalling or selective systems." Standard Telephones & Cables, Ltd., J. G. Flint, T. S. Skillman, and S. H. Grove. March 18th, 1931. (375349.)

8327. "Electric devices for driving the turntables of talking machines." Pollux-Motoren-Vertieb Ges. September 27th, 1930. (375307.)

8331/2. "Electric switches and circuit breakers." British Electrical & Allied Industries Research Association, E. B. Wedmore and W. B. Whitney. March 18th, 1931. (375308/9.)

8652. "Telephone systems." Automatic Electric Co., Ltd., H. S. Deyes, A. C. Corner and C. E. Beale. March 20th, 1931. (375380.)

8713/4. "Electrically operated pumps." J. Lucas, Ltd., and R. Simpson. March 21st, 1931. (375291/2.)

8715. "Rotary electric switches." J. Lucas, Ltd., and W. H. Egginton. March 21st, 1931. (375293.)

8765. "Telecommunication systems." Lignes Télégraphiques et Téléphoniques. June 2nd, 1930. (375353.)

8919. "Supervision and/or remote control of electric power-transmission equipment." Automatic Electric Co., Ltd., G. A. Burns, T. R. Rayner and P. F. Gunning. March 23rd, 1931. (375325.)

8920. "Automatic switches for use in telephone or like systems." Automatic Electric Co., Ltd., and R. Taylor. March 23rd, 1931. (Patent of addition not granted.) (375326.)

8925. "Telephone systems." Automatic Electric Co., Ltd., R. Taylor, F. T. Belas and J. W. McClew. March 23rd, 1931 (375384.)

8935. "Television and like systems." Marconi's Wireless Telegraph Co., Ltd., and H. M. Dowsett. March 23rd, 1931. (375385.)

9013. "Control of radio apparatus." F. Murphy and E. J. Power. March 24th, 1931. (375357.)

9021. "Mechanical drive transmission for electric rail and other vehicles." Sir W. G. Armstrong, Whitworth & Co. (Engineers), Ltd., and P. D. Ionides. March 24th, 1931. (375387.)

9022. "Production of porous or permeable coatings for use in galvanic cells." G. Ludecke. March 26th, 1930. (375,388.)

9033. "Thermionic valves." M-O Valve Co., Ltd., and C. J. Smithells. March 24th, 1931. (375389.)

9125. "Electric quick make-and-break switch mechanism." F. L. Cook. April 17th, 1930. (375390.)

9133. "Variable electric resistances." J. R. Spink and J. B. Langley. March 25th, 1931. (375392.)

9163. "Electrical test boards, instrument boards, and the like." Exchange Telegraph Co., Ltd., and E. Steadman. March 25th, 1931. (375398.)

9225. "Electric telegraphy." Standard Telephones & Cables, Ltd., and K. E. Latimer. March 26th, 1931. (375405.)

9251. "Glow-discharge lamps." Electrical Research Products, Inc. April 5th, 1930. (375407.)

9256. "Television and like systems." J. H. O. Harries. March 26th, 1931. (375408.)

9290. "Receiving apparatus for electric wave signals." J. Robinson and British Radiostat Corporation, Ltd. March 26th, 1931. (375410.)

9425. "Television systems." Electrical Research Products, Inc. April 8th, 1930. (375422.)

9642. "Telephone systems." Automatic Electric Co., Ltd., F. T. Belas, and J. W. McClew. March 30th, 1931. (375441.)

9762. "Metal-vapour arc rectifiers and like apparatus." International General Electric Co., Inc. April 2nd, 1930. (375447.)

9871. "Electric signalling systems and apparatus." R. C. Graseby and S. J. Matthews. April 1st, 1931. (375450.)

10072. "Electric cables." Callender's Cable & Construction Co., Ltd., and P. V. Hunter. April 2nd, 1931. (375455.)

11025. "Electric terminals." Siemens Bros. & Co., Ltd., and H. G. Wood. April 14th, 1931. (375465.)

11934. "Electric lamps." British Thomson-Houston Co., Ltd. April 22nd, 1930. (375477.)

12267. "Indirectly heated cathode for thermionic valves." Dr. S. Loewe and B. Wienecke. April 29th, 1930. (375481.)

15299. "Electric circuit breakers." G. Ellison and G. Ellison, Ltd. May 23rd, 1931. (375506.)

15361. "Transformer, choke, or the like, and a method of manufacturing the same." C. J. Owen, and Automatic Coil Winder & Electrical Equipment Co., Ltd. May 26th, 1931. (375507.)

16505. "Insulated electrical conductors." General Cable Corporation. June 18th, 1930. (375522.)

17493. "Circuit of electric blasting fuses." Lignoza Spolka Akcyjna. July 23rd, 1930. (375536.)

17562. "Loud speaker." Magnavox Co. February 20th, 1931. (375538.)

18847. "Electrical indicating circuits and instruments." E. N. Elford. June 30th, 1931. (375556.)

19560. "Electric resistance furnaces." Allmänna Svenska Elektriska Aktiebolaget and L. Hogel. July 7th, 1931. (375562.)

19593. "Heterodyne receivers." Telefunken Ges. für Drahtlose Telegraphie. July 7th, 1930. (375563.)

20119. "Electrical oscillation generators." Marconi's Wireless Telegraph Co., Ltd. July 18th, 1930. (375568.)

20577. "Electric lamp failure indicators." H. W. Watson. July 18th, 1931. (375576.)

21509. "Electro-therapeutic apparatus." Dr. L. H. Stiebock. August 9th, 1930. (375587.)

21696. "Television scanning systems." A. J. Cawley. August 7th, 1930. (375589.)

22183. "Photo-electric cells." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 27th, 1930. (375595.)

23012. "Loud speakers and like apparatus." Soc. Française Radio-Electrique. August 14th, 1930. (375598.)

25308. "Photo-electric cells." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 27th, 1930. (375614.)

25637. "Radio and other high-frequency receivers." Siemens and Halske Akt.-Ges. September 13th, 1930. (375620.)

26370. "Modulated carrier transmitting systems." Soc. Française Radio-Electrique. September 27th, 1930. (375629.)

26958. "Portable X-ray apparatus." C. H. F. Muller Akt.-Ges. October 4th, 1930. (375633.)

27240. "Electric heaters for the continuous heating of wires, threads, bands, rods, or the like." General Electric Co., Ltd. October 20th, 1930. (375638.)

27341. "Photo-electric cells." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 1st, 1930. (375639.)

27953. "Anode batteries for wireless receivers." J. J. Pala. October 8th, 1931. (375644.)

29050. "Electric incandescent lamps." P. Borri-Brunetto. October 19th, 1931. (375657.)

29142. "Systems of television." British Thomson-Houston Co., Ltd. October 21st, 1930. (375658.)

29184. "Driving means for the distributors of electric ignition devices." R. Bosch Akt.-Ges. November 28th, 1930. (375659.)

29661. "Ventilation of dynamo-electric machines." Akt.-Ges. Brown Boveri et Cie. November 15th, 1930. (375664.)

29902. "X-ray tubes." International General Electric Co., Inc. October 28th, 1930. (375669.)

32929. "Sockets for electrical contact pins." E. Kleinmann. November 27th, 1931. (375691.)

33387. "Ceramic electric heating bodies." Porzellanfabrik K.A.H.L.A. March 13th, 1931. (375692.)

34766. "Electrical high-frequency oscillatory systems." Marconi's Wireless Telegraph Co., Ltd. January 26th, 1931. (375698.)

35130. "Electric valve circuits." British Thomson-Houston Co., Ltd. December 24th, 1930. (375705.)

35495. "Armatures for electric pick-ups with screwless needle-holder." H. Sachs. December 24th, 1930. (375708.)

1932

1103. "Electric condensers." R. Bosch Akt.-Ges. January 28th, 1931. (375718.)

1363. "Electric motors." International General Electric Co., Inc. January 16th, 1931. (375721.)

2286. "Modulation circuit arrangements for wireless signalling and the like." Telefunken Ges. für Drahtlose Telegraphie. January 24th, 1931. (375725.)

2611. "Acoustic adjusting apparatus for use in sound studios and the like." Marconi's Wireless Telegraph Co., Ltd. January 28th, 1931. (375726.)

3585. "Magnetic ignition apparatus." R. Bosch Akt.-Ges. February 21st, 1931. (375729.)

5692. "Radio receivers." Marconi's Wireless Telegraph Co., Ltd. February 25th, 1931. (375737.)

7345. "Electrical connectors embodying switches." R. F. Power. December 22nd, 1930. (Divided application on 38518/30.) (375328.)

9428. "Electric quick make-and-break switch mechanism." F. L. Cook. June 21st, 1930. (Divided application on 9125/31.) (375427.)

11879. "Automatic coin-freed telephone exchange." W. Aeschlimann. May 16th, 1931. (375749.)

12651. "Means for damping the oscillations of electrical conductors." Vereinigte Aluminium-Werke Akt.-Ges. May 2nd, 1931. (375750.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any one of the proposed marks may be entered within one month from July 13th:—

Calomic, No. 532623, and Telconstan, No. 532624. Class 5. Unwrought and partly wrought metals used in manufacture.—Telegraph Construction & Maintenance Co., Ltd., 38, Old Broad Street, E.C.2.

Criterion Radio Products (lettering and design). No. 532181. Class 8. Radio-telephonic receiving and transmitting sets and television apparatus.—Criterion Radio Products, Ltd., Tuscan Street, Bethnal Green, E.2.

Wiretron. No. 532185. Class 8. Philosophical and scientific instruments and apparatus for useful purposes. No. 532186. Class 13. Metal goods not included in other classes.—Radio Disposals, Ltd., 144a, Red Bank, Cheetham, Manchester.

MSM (lettering and design). No. 532305. Class 8. Mercury switches.—Mercury Switch Manufacturing Co., Ltd., Horton Lane, Yiewsley, West Drayton, Middlesex.

Perwis. No. 532189. Class 13. Electric lamps (ordinary), electric switches, &c.—B.M.A.C., Ltd., 79a, Parkhurst Road, Holloway, N.7.

Bellerwere. No. 530848. Class 50. Moulded articles made from synthetic resin.—Barrett & Elers, Ltd., 51, Dace Road, Old Ford, E.3.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alton (HANTS).—Houses (50), Anstey site; U.D.C. surveyor.
Ashbourne (DERBYSHIRE).—Houses (50); U.D.C. surveyor.
Ashington.—Houses (70); G. Beatly, U.D.C. surveyor, Council Offices.
Ayr.—Houses (208); borough surveyor.
Bath.—Houses (178), Bloomfield Road, for Mr. Shellard, Odd Down.
Bedford.—Dairy, Britannia Place; Bedford Co-operative Society.
Bedlington (NORTHUMBERLAND).—Houses (60), Stakeford, for U.D.C.; G. Towers, builder, 77, Union Street, Blyth.
Beith (AYRSHIRE).—Re-erection of Nettlehirst, Barrmill (mansion), for Mrs. Kerr.
Biggar.—Houses (20); borough surveyor.
Birmingham.—St. Joseph's and St. Helen's R.C. Church (£9,000); J. A. Brazier, Ltd., builders, Worcester Road, Bromsgrove.
Blyth.—Houses (50), South Farm; borough engineer.
Bolton.—Houses (252); H. E. Pitt, Ltd., builders, Leopold Street, Millfield, Sunderland.
Bradford.—Houses (299), Dick Lane, Tyresal, Bradford, for Sutton Dwellings Trust; Chorley, Gribbon & Foggitt, architects, 3, Park Place, Leeds.
Brighton.—Elementary school, Woodingdean, for E.C.
Bromley (KENT).—Houses (25), Ronalds Road; Sykes & Pomfret.
Cannock.—Premises, Progressive Club; S. Harrison, architect. Banks for National Provincial Bank, Ltd., and Midland Bank, Ltd. Offices for Britannic Assurance Co., Ltd., Birmingham. Reconstruction of Crown Hotel, Market Place; proprietors.
Cheshire.—School, Runcorn; county architect, Chester.
Chesterfield.—Public abattoir for T.C.: E. G. Felgate, architect, Cook Lane, Keighley.
Cleobury Mortimer (SALOP).—Houses (20) for R.D.C.; Ellams & Doughty, builders, Highley.
Croydon.—Nurses' home, Mayday Hospital (£20,000); Mr. Berney, architect. Houses, Waddon Estate (192), Ham Farm (90), and Windmill Road (10); borough engineer. Houses (141), Brooklyn Estate; J. R. Oddy, 14, Senhouse Road, Cheam, Surrey.
Derby.—Greyhound racing track; T. Blackburn & Sons, constructional engineers, Preston.
Dewsbury.—Reconstruction of drying and store rooms; Hemingway & Bindschadler, Church Street.
Dudley.—Houses (68), Priory Estate (£20,464); Housing, Ltd., Blackheath.
Dumfries.—Houses (96); John Barker, borough surveyor.
Dunoon.—Houses (40); Stirling & Brown, Dunoon.
Durham Co.—Schools, Lanchester, Burnhope, and Wheatley Hill. Electrical work at Durham Girls' County School, Wolsingham Council School, Newton Cap Council School, Waldridge Lane Council School, Washington Biddick Council School, and High Grange Council School; F. Willey, 34, Old Elvet, Durham. Alterations and additions to the council school, Tow Law, for the C.C.; J. Ayton, builder, North View, Blackhill.
Easington (Co. DURHAM).—Houses (350); U.D.C. surveyor, Council Offices, Easington.
Eastbourne.—Colonnade and bandstand (£50,000), Grand Parade; D. Stonham, architect, Hadley House, Upperton Road.
East Lothian.—Houses (120); county surveyor.
Gateshead-on-Tyne.—Warehouse for Finney & Co. (£6,000); Liddell & Bachelor, architects, 12, Eldon Square, Newcastle. Houses (22), Shipcote Lane; W. E. Hall & Son, builders, Low Fell.
Glasgow.—Picture house (1,600 seats), Possilpark; W. H. Martin, 147, Bath Street.
Gosforth (NORTHUMBERLAND).—Greyhound racing track for U.D.C.; J. T. Shevill, 43, Hawthorn Street, Newcastle.
Great Yarmouth.—Post office and telephone exchange, Regent Street, for H.M. Office of Works, King Charles Street, S.W.1. Theatre; Theatre Royal Syndicate.
Hebburn-on-Tyne.—Alterations to A. Reyrolle & Co.'s warehouses; Cackett, Burns, Dick & MacKellar, architects, 21, Ellison Place, Newcastle.
Hornchurch (ESSEX).—Church (£8,654), for Holy Cross Church Building Committee; secretary.
Houghton-le-Spring.—Houses (24), Shiney Row; R.D.C. surveyor, Council Offices.
Ilkeston.—Houses (158), Heanor Road site; borough engineer.
Inverness.—Houses (34), with electrical work, for T.C.; W. Smith, architect, High Street.
Ipswich.—Extensions, Ipswich School (£15,000); governors.
Irish Free State.—(DROGHEDA, Co. LOUTH).—Houses (56) for Corporation. (Co. SLIGO).—School building scheme; J. K. Murphy, Courthouse, Sligo. (CORK).—Houses (390) for Corporation. (WEXFORD).—Houses (40) for Corporation. (NORTH CORK).—Houses (860) for County Board of Health. (DUNDALK, Co. LOUTH).—Houses (90); Macdonald & Sons, builders (82), and P. McKenna & Sons (8), builders, Dundalk.
Jedburgh.—Houses (£19,000); borough surveyor, Town Chambers.
Kendal (WESTMORLAND).—Houses (100) for T.C.; Lloyd & Cross, builders, Birkenhead.
Kent.—Central schools, Hersden (£8,742), with lighting and heating work; county architect, Maidstone.
Lanchester (Co. DURHAM).—Houses (50); U.D.C. surveyor, Council Offices.
Leeds.—Houses (265,) Halton Hill, for Sutton Dwellings Trust; Chorley, Gribbon & Foggitt, architects, 3, Park Place, Leeds. Estate development, Green Hill Lane, Wortley, for Scott Bros.; A. Hodgson Doyle.
Liverpool.—Proposed extension of factory, Walton; Dunlop Rubber Co., Ltd.
London (CAMBERWELL).—Extensions, St. Giles' Hospital (£22,364), for the L.C.C. (GREENWICH).—Houses (84), Hughes Field Estate (£36,700); J. E. Billings & Co., Ltd. Extensions, St. Alfrege's Hospital (£20,395); Wm. F. Blay, Ltd., Dartford. (MORDEN).—Houses (346), St. Helier Estate; C. J. Wills & Sons, Ltd. (POPLAR).—Constructional works, Isle of Dogs pumping station (£11,363); Mitchell Bros., Sons & Co., Ltd. (PUTNEY). —Flats (232), North House Estate, Putney Hill: John Laing & Son, Ltd.
Long Eaton.—Houses (22), for U.D.C.; F. E. Wheeldon, builder, Belper.
Machynlleth (MONT).—Hospital; secretary to the committee.
Maidstone.—Houses (44), Ringlestone Estate; T. F. Bunting, borough surveyor.
Manchester.—Railway station at Besses-o'-th'-Barn, between Whitefield and Prestwich, for the L.M.S. Rly. Co.; A. Newlands, chief engineer, Euston, N.W.1. Princess Hotel, Princess Road South and Mauldeth Road West, Withington, for Threlfall's Brewery Co., Ltd., Cooke Street, Salford; B. Waterhouse, resident architect.
Mansfield Woodhouse.—Houses (36), Slant Lane Estate; L. Walker, U.D.C. surveyor.
Mexborough.—Nurses' hostel (£8,500) for the Board of Management of the Montague Hospital; David Harrop, architect, Bank Street.
Nantwich (CHESHIRE).—Houses (62), Wall Fields Estate, for U.D.C.; Birchall Bros., builders, Middlewich.
Newcastle-on-Tyne.—Houses, Cowgate (100) and Ferguson Lane Estate (198), for the City Council; R. Roberts, architect, 18, Cloth Market. Houses (90), Jesmard Towers Estate; Storey and Reid, builders, Glendale Avenue, Monkseaton, and H. and S. Alderson, builders, 3, Ashfield Road, Monkseaton.
Northern Ireland.—(NEWTOWNBUTLER, Co. FERMANAGH).—Elementary school, for the Very Rev. Thomas O'Doherty; James Donnelly, architect, Enniskillen.
Northfleet.—Houses (37), Robina Avenue; C. J. Howard.
Norton-on-Tees.—Housing scheme (£13,000); T. Forrest, surveyor, Council Offices.
Nottingham.—Lace factory for Robert Shaw; W. B. Starr and Hall, architects, 12, Victoria Street.
Oxford.—Boys' secondary school (£23,000), for the City E.C.; director of education.
Paignton.—Houses (20), Tweenway Road; A. G. Wyatt.
Pitlessie (FIFESHIRE).—Electric lighting installation in school (£65); headmaster.
Pontefract.—Hotel, Upton; Pennington, Hustler & Taylor, architects.
Prudhoe (Co. DURHAM).—Extensions to Prudhoe Colony (£48,000); J. H. Morton & Sons, architects, Fowler Street, South Shields.
Quarry Bank (STAFFS).—Picture house, High Street, for C. F. Couper, Brierley Hill.
Ramsgate.—Refuse destructor (£6,000); J. Fluck, borough engineer.
Ryton-on-Tyne.—Houses (100); F. D. Dalton, U.D.C. surveyor, Council Offices.
Saffron Walden.—Cinema, Station Street; E. H. Cooper.
Scarborough.—Shops. Northstead Estate, and flats (28), Northstead Estate; H. W. Smith, borough engineer, Town Hall.
School Aycliffe (Co. DURHAM).—Institute for the mentally defective (£125,000); County Architects' Dept., Shirehall, Durham.
Seaford (SUSSEX).—Cinema, dance hall and café, for L. Fraenkel.
Sedgefield.—Houses (100); J. Stones, R.D.C. surveyor, Council Offices.
Southall.—Houses (81), Rutland Road; G. Wimpey & Co., Ltd.
Southend-on-Sea.—School ((£31,000), Thorpe Bay; director of education. Extensions, Rochford Institution, for the P.A.C.; clerk.
South Shields.—Houses (48), Marsden; W. Walsh, R.D.C. surveyor. Houses (142), Quarry Lane; J. Paton Watson, borough surveyor.
Sunderland.—Houses (300), Grindon Estate; W. & T. R. Milburn, architects, 17, Fawcett Street.
Sutton Coldfield.—Houses (40), Heathlands Road; Excelda Housing Supplies.
Swansea.—School, Gorse Road, Cockett; E. E. Morgan, architect, 3, Prospect Place.
Tunbridge Wells.—Eye and ear hospital for the Committee of the General Hospital.—J. Jarvis, Ltd., builders, 6, Vale Road.
Wallasey.—Houses (60), Pasture Estate; borough engineer.
Wallsend-on-Tyne.—Houses (120), Howdon, for the T.C. (£30,162); Ball & Thomas, builders, 12, Brankingham Terrace, Norton-on-Tees.
Welwyn Garden City (HERTS).—Houses (57) and flats (8), for the U.D.C.; G. R. Barnsley, architect, 7, Grosvenor Street, W.1. Rebuilding Cherry Tree Restaurant (£26,000), for Welwyn Garden Restaurants, Ltd.; C. J. Theobald, managing director.
West Stanley (DURHAM).—Houses (100); A. Routledge, U.D.C. surveyor.
Whitchurch (SALOP).—Electrical installation at 24 houses, for U.D.C.
Whitehaven.—Houses (100), Woodhouse Estate; borough surveyor.
Wigan.—Houses (54); W. A. Walker, borough engineer.
Woking.—Rebuilding Palace Theatre, Duke Street, with heating, ventilating, and lighting work; proprietors.
Worthing (SUSSEX).—Development of Uplands Estate, Salvington, by F. Feest; D. C. Payne, estate surveyor.
Wortley.—Houses, Mortomley (26), Oughtibridge (30), and Stannington (12); W. Marlow & Sons, builders.